REMOTE IMAGING GROUP 34

JOURNAL NO.34

SEPTEMBER 1993

The Lecturers: Left to Right
Jim Bacon, Geoff Perry, Henry Neale, Christian Ripley, Dave Cawley, John Dubois, Steve Pada

Our Overseas Visitors.

REMOTE IMAGING GROUP JOURNAL No.34

SEPTEMBER 1993

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All Colour and B/W photos of the RIG 93 Conference by Richard Harcourt ABIPP, G7MUB

Front Cover: Henry Neale at the RIG demonstration stand.
Centre Pages: All the visitors to the RIG Conference 1993.

REMOTE IMAGING GROUP.....OFFICERS 1993

VAT Registration No. 594 7483 83

CHAIRMAN	Henry Neale, G3REH Thornlea, Fishergate, Sutton St.James, Spalding, Lincs. PE12 0EZ Tel: 0945 85353
SECRETARY	John Tellick 34 Ellerton Road, Surbiton, Surrey, KT6 7TX Tel: 081 390 3315
MEMBERSHIP SECRETARY	All membership enquiries Ray Godden, G4GCE Wayfield Cottage, The Clump, Chorleywood, Herts. WD3 4BG Tel: 0923 720714
TREASURER & ADVERTISING MANAGER	Mark Clarke, G3CQL 9 Park Lane, Bulmer Tye, Sudbury, Suffolk, CO10 7EQ Tel: 0787 374128 (7pm-9pm) Fax: 0787 475029
JOURNAL EDITOR	James Brown 21 Windsor Rd, Porthcawl, Mid Glamorgan, CF36 3LR Tel: 0656 782632
MAKE-UP EDITOR	Mike Goodall, G0MGI 2 Meadow Court, Littleport, Ely, Cambs. CB6 1JW Tel/Fax: 0353 860646
RALLY AND EXHIBITION COORDINATOR	Dave Cawley Fieldfare, Wickhambrook, Newmarket, CB8 8QA Tel: 0440 820040
COMMITTEE	Les Currington, Peter Wakelin, Chris Kaley, Michael Gill
RIG BBS RIG PACKET	Tel: 0945 85666 (300Bd up to V42MNP2-4 & V42BisMNP5) G3CQL @ GB7NNA - "RIG WXSAT BULLETIN"
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CHAIRMAN'S WAFFLE

HENRY NEALE

Well after all the butterflies and anticipation, the RIG Conference was a success. Not just a minor attraction on the calender, but something that was extremely worthwhile and was timed to allow everybody all the time for those personal questions and having a word with what's-his-name. It was not budgeted to make a profit, but a small loss. Next time it will be more expensive but we all now know what to expect. There is talk of holding a one day affair next year alternating with the full week-end the following year - hence the enquiry box later on in the Journal. I reckon that the hotel must have seen some of you before, and possibly regretted taking the booking. They wanted to see the colour of our money at a very early stage! Some of you hadn't been there before as part of a rugby club stop-over had you? Anyway, somebody in room 648 left something behind, and as we didn't keep any records of who was in which room, we couldn't advise the owner of his loss!

My words at the start of my talk rang ever true - "After this talk things can only get better". I think that was an understatement! My own problem was that my notes had been printed out in haste just before leaving - without checking them. They started correctly but the laser printer has a habit of missing the top line off of the page if it is right at the top! It was correct on the first page but the remaining 7 pages had this effect on them. Just miss the top line off and it makes the rest look like rubbish and it's very difficult to fill in the gaps - especially when you are not prepared! IT WILL NOT HAPPEN AGAIN! Everything else - with the exception of the slide projector - went well. All the lectures were fully attended. The trade stands shut down while they were on - even the traders didn't want to miss anything! Everybody agreed that they had enjoyed the Conference and that it had been a great success.

I must thank Dave Cawley for all the work he and his staff put into the event. It was a credit to him. I must also thank Mark and his wife Janet for their work behind the scenes sorting out the Hotel account - it was not an easy chore and there was a lot of re-arranging to be done. I will say that now we have a successful event behind us we will be less hesitant about doing it all again - well - not till next year! Let Sam at Timestep know what you would like us to put on for you next time and we will see what we can do.

On the Friday afternoon of 16th July there was a local thunderstorm and the internal modem on the Bulletin Board was disabled. It was not directly hit but it stopped working. There were no visible signs of damage and it has been sent for repair. On Monday afternoon the 19th July a new Miracom HST Dual Standard modem was purchased and installed. It is much more amenable to other types of modem and several members are now logging on at much higher speeds - 9600, 12000 or 14400 are common. The data just falls down the wires at those speeds - 100 Kbyte per minute! or even faster! The noisy lines have not disappeared completely but when 650 Kbytes go out the door without so much as a crc error things must be getting better. I think that the bad lines are only used at peak times. Anyway if you can get away with charging for wet string - you cannot blame them.

I have had the chance to proof read some of this Journal before typing in this waffle and it looks like the best we have had so far. If you don't find something that interests you this time perhaps you should take up gardening! I am impressed with the quality of the items. I know that James and Mike can do wonders with mediocre products, knocking them into shape, spell checking and even re-writing sections. Their results are quite good, but when top notch articles are sent in there is very little to do to them and it makes their work that much easier. Several of the articles that appear this time were well prepared and are very comprehensive. Their quality stands out for us all to see. As usual we are looking for articles and James is the one to send them to.

My apology of a motor car has just had its 180,000 mile service and it reminded me of someone looking inside it and saying I might have known! A car with an altimeter! Well it might not seem as strange as it looked - I have always been a VHF man and, on those rare occasions when the better half and I get a chance to leave the Bulletin Board behind, we visit different parts of the countryside. I always look at the views and wonder if its a good 70 cms site etc. and the addition of an altimeter is a good point to start with. Living in the middle of a large plateau with a small hill in the middle, may be high, but a sharp escarpment on as many sides as possible always wins hands down. The important thing to remember is to reset the device when you start off. All I need now is an electrical giro and who knows what?

Blue LEDs have resurfaced again and I think that some of you contemplating making hard copy machines will soon be saving up. A preproduction device has been manufactured by Toshiba that produces 500 millicandelas! As you might expect it is not cheap -just under £1 per millicandela! This does means that there might be reject devices coming on to the surplus market soon - and then the stepper motors will be whirring. The device I bought, a couple of years ago, is only 15 millicandelas and cost about £10, so watch this space.

I will finish on a good bit of news for those of you thinking of purchasing ProSatII. The price has been reduced by £24! It now costs £98 and the P & P bring the price up to £100. Extra features have been added and are detailed elsewhere. Dot-matrix printers and HP Laserjet 4's are additionally catered for and there is even griding on Meteors. Windows fans can now export files in a .BMP format and those of you that want a picture saved during the daytime, when you are not there, are treated to a scheduling system. Those that want colour at the press of a button now have Auto colour. These features and others are now available to existing owners for the upgrade price of £15 inclusive. It consists of a new Manual and a set of original disks. This is much more than an update and hence the price has had to be increased.

That about winds it up for this time and I had better get on with the Harvest. I have been behind with despatch of goods again, and again I should have caught up by the time you read this. My apologies to those that have suffered. And, by the way, just because we now handle plastic, it is not a quick method of getting goods; it is only an alternative way of paying for them. Despatch still uses the normal methods, takes time and is sometimes delayed!

Finally, if anyone is building, or comtemplating building the recently published Marciano PDUS or HRPT systems, let me know so that I can co-ordinate the efforts.

Best Wishes, Henry. PS the item in room 648 had a puncture!

FROM THE EDITOR'S DESK

JAMES BROWN

As we go to print the weather is yet again making the headlines. The Mid-West of the USA is gradually turning into a new 'Great Lake' with a conservative estimate of flood damage rated at 9 billion dollars, and it has been suggested that the weather pattern responsible could run on for weeks to come. Over the other side of the world, northern India has known Monsoon floods the worst for over fifty years. At the same time record high temperatures in the USA northernmost territory have earned it the new name of 'Baked Alaska'!

Is this just part of a long term cycle, to which, it has been suggested, the end of centuries can be particularly prone? Alongside these events, new studies of deep Greenland ice cores have revealed that the change from global warming to mini-ice ages can be swift and unpredictable. It may be that even as we write the very complex balance of our planetary weather system is preparing to do a flip-flop into a new climatic phase. We have no way of knowing what may be around the next corner.

What is clear however, is that free access to the satellite monitoring systems which internationally we have come to rely upon is vital to the long term interests of us all.

Amazingly against the background of all of that, we have to alert you to the news that this is the very time when our own European meteorological authorities are preparing to encrypt all their satellite services, and effectively close the door on decades of freedom of information, rendering countless thousands of stations inoperative, and making vast amounts of valuable equipment totally worthless. One can hardly believe the degree to which monetary policy has taken over. As totalitarian regimes the world over have crumbled into the ruins of history, EUMETSAT, who have been heavily leaned upon, have caved in, and are preparing a new age of totalitarian control of satellites, funded largely by our own taxes.

In a world of new international openness, EUMETSAT in its going it alone policy will be the satellite pariah of the world. And not only is current policy that by the end of 1995 all PDUS transmissions will be encrypted, but by the end of the century WEFAX SDUS will be abandoned in favour of a new low

data rate digital transmission. Why? For a new excellence in image transmission? NO! So that it also can be encrypted from the word go. And where does this leave the USA and the USSR?

We are making this known now, because we are still hoping to bring pressure to bear on the authorities to allow non-profit making amateurs and schools etc., a continued free access to data. To that end we have set up a small working group charged with the responsibility of acting swiftly, unitedly and decisively in securing meetings with the British Meteorological Office. Many of our overseas readers also rely heavily upon METEOSAT products, and we suggest that you mobilise efforts to lobby your own national governments at the same time.

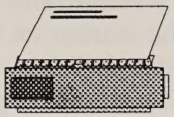
The danger of doing nothing is that NOAA may take offence at European policy, and play 'tit for tat', in which case we might as well call it a day. It may be that there could be a small fee payable for the right to access data, but my own guess is that chicken feed is not what they are after, and the alternative is beyond most of our pockets. Never has the phrase 'Watch this space' carried so much seriousness. A full copy of the EUMETSAT encryption policy document is printed later in this journal.

In the mean-time our thanks go once more to the many who have ensured another block-buster edition. Our apologies again to some whose contributions we have had to hold over, but we make no apologies for featuring our conference, which by unanimous approval was an outstanding success. For those who couldn't attend, we hope you catch the flavour of it, and if there is a next time... well...
Here's hoping for a sunny August, James Brown.

INFO...

Local Rig Meeting at Worthing.
Following the successful meeting of West Sussex members of RIG last February, it has been decided to hold another meeting during September or October. As before, the meeting will take place in Worthing on a Saturday afternoon. For more details contact Nick Quinn on 0903 814090 during evening hours, or write with a SAE to 15 Newham Lane, Steyning, West Sussex, BN44 3LR, or via packet to G0BAF @ GB7VRB. If you are able to give a short talk (10 to 15 mins.) on some aspect of Remote Imaging, then please let him know.

FROM THE MAKE-UP EDITOR'S KEYBOARD *MIKE GOODALL*



A couple of changes have occurred since the last issue. As you will have noticed by now, we are using an art paper for the whole of the Journal, not just the centrefold picture section. This will enable us to put in illustrations amongst the text, and avoid us having to divorce the pictures from the articles as in previous issues. The new paper will also result in an easier to read, crisper print.

The second change involves the Rig Shareware Library. Over the past months it has been getting more and more difficult for me to find the time to review all the new shareware programs and updates that have been sent in. (I shall still try, however, to cope with the RIG GIF Library, as this involves less work.) Les Hamilton, a member from Aberdeen, whose name will be familiar to many of you, has offered to take over the Shareware side. He will be reviewing all the software sent in, and writing the reviews in the Shareware Corner pages. **As from 1st September all requests for copies of the Shareware Disks 99 to 99D should be sent to him at...**
LES HAMILTON, 8 DEESIDE PLACE, ABERDEEN, AB1 7PW.

The same rules as the RIG GIF Library apply (please read them carefully!) Just one other exception... 1.4Mb 3.5" DISKS ONLY!

I am extremely grateful to Les for taking over the Shareware side from me, which may otherwise have had to be discontinued. After all there are only so many hours a day, and we all have to earn our living first! It is the same problem as the many other services RIG has supplied in the past (such as the RIGSHOP). A small job to start with, but as it grows and grows, it becomes no small task. There have been well over 400 requests for Library pics and Shareware to date; at least proving a need for the service. Judging by the letters I receive, it is very much appreciated by the members.

This issue has been a bit of a rush for me, as I had my holidays in the middle of July, which fell during the time I was making up the pages for this issue. What with coming home to a backlog of work (yes, I really do others things than RIG chores!) as well as putting the final touches to the Journal, it has been a bit hectic. However I got through it all; the results are here to see. I hope that you will agree that this is the best issue that we have ever produced.

I wonder how many of you out there running ProsatII have wondered why the marker on the gridding of Noaas is not always where it should be (over your location). Of course the first requirement is to make sure that your Keplers are up to date (not more than a week or so old). The second requirement is that your CMOS clock on your computer is spot on. (Henry pointed out that if it was only 1 minute out, with the Sat travelling at 5 Miles per sec., this would result in a difference of London to Edinburgh on the gridding). Many PC computer users probably don't notice the time displayed, unless they use Windows or another program that shows it on the screen. You would be surprised how far they can drift. Mine drifts by up to 7 secs a day. Apparently it is not unusual for a clock to be many times more inaccurate. I was recently sent a copy of a shareware program called RighTime. It not only updates your clock every 4 seconds to keep it in line, but learns how slow or fast your CMOS clock runs when on (hot) and off (cold). All you need to do is set the time (via DOS) every day for a few days or a week, and the program does the rest. Within a few days you have a CMOS clock which is virtually spot on. Some users report accuracies of up to 0.1 sec per week! Les has reviewed it in the Shareware corner and put it on the Shareware Disk 99D.

Now "Back to the Future...."

The future deadlines are as follows...

Cover date of Issue	*Deadline for Copy*
DECEMBER 1993	25TH OCTOBER 1993
MARCH 1994	25TH JANUARY 1994
JUNE 1994	25TH APRIL 1994
SEPTEMBER 1994	25TH JULY 1994

Advertisers copy will be required 7 days earlier than the deadline date, and should be sent direct to Mark Clarke. Late ads will not be included. These dates will be rigidly adhered to and there will be NO exceptions.

Also, remember that Members Private Advertisements are *FREE!* If you have any RIG-related equipment for sale, send in the details to James.

PLEASE REMEMBER... SEND ALL COPY FOR ARTICLES, READER'S LETTERS, ETC. DIRECT TO JAMES BROWN.

I only deal with the RIG GIF Library on a direct basis. ***I can only accept calls about the GIF Library from 2 till 4 in the afternoon.*** *For all enquiries regarding GIF viewing programs and suitability for your specific computer, contact the appropriate member listed on the Helpline page.*

COMPOSITE COLOUR IMAGERY ON THE PC.

Mark Pepper

(A follow up to C.G. Roberts' article, RIG 33)

Mr Roberts' article (RIG 33) was an inspiration for me. I had been wanting to produce and print colour weather pictures for some time but, was not having a great deal of success with the various colour attribution systems offered by the majority of dedicated weather FAX software around. The problem was that all the pictures I had received were taken in Winter when there is a lot of cloud cover. When coloured, these images produce very small land fragments which are often a similar shade to the clouds. Assigning various colour to specific ranges of grey produces pictures of land submerged under water and areas of sea reclaimed as land. Not very impressive according to my wife. This effect will be less pronounced during the Summer but still far from perfect on cloudy days, something that we get to enjoy in the UK most of the year round. I was sure I had read somewhere, and had thought it must be possible to combine images taken at different wavelengths, after all most of the ESA literature contained combined and enhanced images from somewhere. Mr Roberts' article was therefore the inspiration I needed.

The big problem was what to use to combine and manipulate the images. Mr Roberts' article talked of professional software written specifically for this task, however, I only have access to an IBM PC and I suspect the B/Ae Dartcom Rasterex Satellite System is beyond my reach. Fortunately, however, I had previously done some extensive research into combining red, green and blue colour images. This was done after the building of a video frame store and the acquisition of a Logitech Photoman camera. Both these devices produce monochrome data output but with the addition of the correct RGB filters can be persuaded to take static colour pictures. The separate filtered monochrome images being mixed by a computer. After a long search I found a number of software packages capable of combining the separate RGB filtered images to produce a full colour picture.

Everything fell into place; I had the software; I just needed the bang on the head to make me realise how to produce good colour weather pictures. Mr Roberts provided the bat.

Receiving the images is easy, but the software I use requires images of identical dimensions to later combine. Timestep's excellent PROsatII came to the rescue. Meteosat images are easy, just save images from IR and Visible sensors that are transmitted during consecutive or very nearly consecutive

slots, eg the C2D and D2 images transmitted at 12:54 and 12:58 UTC. (One point to make about Meteosat images is that the best images will occur around midday because it is only then when the visible frames are fully illuminated by the sun). NOAA images are more difficult and Meteor images are as far as I can see impossible. The trick with NOAA images is to use PROsat 11 to select first one side of a NOAA IR/VIS pass and use the 'Save Section' option, then select 'Swap' from the 'Section' pull down and save the other section as before. The result is two .DAT files one containing an IR image and the other containing a visible image of the same area below the satellite.

The .DAT images can be loaded into graphics packages as .RAW (various other extensions can be used but they all indicate raw pixel data only) images, 640x800 pixels. However, with the availability of NOATIF on the RIG BBS converting the .DAT files to .TIF files saves a lot of time and typing.

Once converted to .TIF files the images can be loaded into the all important image manipulation package. There are a lot of these packages available, and I mean a lot, unfortunately, you can count on one hand the number of packages that are sophisticated enough to perform image computation and colour plane combination. Fortunately, my job allows me to assess the capabilities of many packages and I have found that the following have what is required: Aldus Photostyler, Image-In and Corel 4 (yes 4 and not 3) Paint. You may notice that all these packages run under Windows, unfortunate I know, especially if you have a resource challenged machine. I did come across a DOS shareware package once designed to combine colour press images but the documentation was in Italian and I could not get it to run without hanging my PC. There are only two other packages that may work, one is Adobe's Photo Shop and the other Timestep's software advertised on the back of RIG 33. One big advantage with Windows, however, is that you should be able to get a good printer driver and consequently, good printed results whether you have a low cost 9 pin dot matrix, a laser or colour wax transfer printer. I use PhotoStyler out of habit. One tip though, the TIF files created by the version of NOATIF I have will not successfully load directly into Photostyler, I have to load them into and save them out of the shareware utility Paint Shop Professional first.

Once loaded into Photostyler, select the picture area only (not the timing bars etc) and perform an equalisation process on both images. This process evenly distributes the pixel values in the image across the full range of brightness levels available. The images are then combined by multiplying each pixel value in one image by the corresponding pixel value in the other image. The

resulting number is divided by 255 (to make it fit into a 0 to 255 grey scale range) and are used to form a new, third image. This third image is again equalised and the three images combined as separate red, green and blue components to produce the final image. The IR image is assigned to the blue channel because IR images can show the sea as bright pixels and we want blue sea. The VIS image is assigned to the green channel because it shows the land as bright pixels and we want green land, and finally the combined image is assigned to the red channel because it works (Sorry!). The result is an image with clear cut blue/black water and green land. Clouds appear from white through magenta to cream but the separation of land, sea and cloud is easily seen and in Mr Roberts' words 'The final image on screen is quite stunning'. I have printed out colour pictures on a cheap thermal wax printer and the results are very pleasing. The images contain much greater apparent depth and clarity than the original grey and attributed colour images.

Something further to try would be to combine the images in different ways. Photostyler has many methods including blend, composite and difference that could be experimented with. Also the resulting images could be assigned to different colour channels, I found assigning them to Hue, Saturation and Brightness channels produced interesting results, and with Meteosat there is the water vapour En formats that could be experimented with too.

What an inspiration Mr Roberts was!

HELP WANTED...

Does anyone have information on a video framestore FS256/4 V2 made by Oggitronics of Essex. Contact: Darren Salter, G1ERM
Tel: 0223 60601 (Home) or 0223 358985 Ext. 3230 (Work)

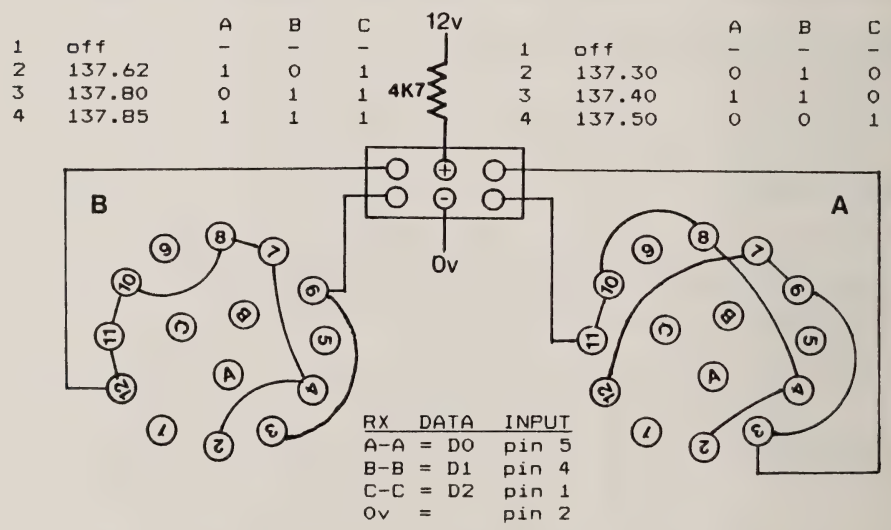
The Editors and Committee
wish to express their sincere thanks to
RIG Member Richard Harcourt ABIPP
for producing all the excellent photographs
of the RIG Conference 1993.

A HARDWARE SOLUTION FOR THE PROSCAN RECEIVER

Ernie Williams

With the PROscan being offered at a good price recently I am sure that a number of members would be interested in a simple external adaption that achieves a preselected channel function at power-up, This is particularly useful for unattended recordings if some form of timer is used, eliminating the need to leave the receiver on continuously and at the same time avoiding some of the 'unusable hops' over the horizon.

As can be seen from the diagram the only components required are two 3 pole 4 way rotary switches, a double pole switch and a resistor. The 12v supply is connected through the resistor to the common connections of the double pole switch, which supplies either one or the other rotary switch with logic levels for the appropriate channel (1-12). The three common connections (A-B-C) are linked across the rotary switches forming the three data output lines (DO-D1-D2) to the 5 pin DIN data in/out socket at the receiver. A-A goes to pin 5, B-B to pin 4 and C-C to pin 1.



Built into a suitable case a two core cable lead-in will be required for the supply and a four core cable connected to a 180 degree 5 pin DIN plug for the output lead.

The 12v supply can be taken from the audio output socket on the receiver - pin 4 (12v) pin 2 (Ov) - but I have used a separate supply as I'm utilising the relay contact pins I and 3 to drive a relay that exceeds the current rating from these pins on the receiver. It is mounted in the same instrument case and acts as an AOS switch, the contacts of which need to be capable of handling mains voltage as the cassette deck I use for imaging can be powered up in record mode. Referring to the diagram, pins 1, 5 and 9 are left open on each switch to create an 'off' position which is necessary for use in scanning mode and it is recommended that they be normally left in this position. The other positions on bank A are 137.30 -.40 -.50 and bank B 137.62 -.80 -.85. The actual wiring is 'as is' with A and B reversed for internal case assembly.

With regard to the AOS switch, I eliminated the problem of relay contact chatter on weak signals by connecting a largish value capacitor across the coil - 2200uf is a suitable value. The terminal markings on the rotary switches are standard as far as I am aware and are available at Maplins (FF75S - break before make) at 98p each.

Ernie Williams, 9 Sherwood Avenue, Droylsden, MANCHESTER. M35 7JJ

UPGRADES...

PC-SAT3 to PCwSatIII Update disk. Dec. 1992, as mentioned in RIG24, incl. MET3-4. £3.00 handling charge, state disk size required.

PROSAT-II Update disk, July 1993, all new features, see main advertisement, £15.00 including P&P. 3.5" disks sent unless advised to the contrary.

SNOISE, Signal to noise measuring program for Meteosat (for ProsatII system only) Send disk and return S.A.E.

TIMESTEP HRPT DEMO DISK, 1.4Mb. £3.00 handling charge.

OFS WEFAX DEMO DISK, 1.4Mb. £3.00 handling charge.

All upgrades available only from the Chairman.

INTERPRETING WEATHER SATELLITE IMAGERY - PART 5

Peter Wakelin

Wind is invisible but careful examination of satellite images can often reveal information about winds on both the large scale and in more localised cases. I shall be writing about high altitude winds and jet-streams in a future issue but this time my subject is the sea-breeze. Sea breezes are welcomed by holiday-makers, essential for the survival of Welwitschia mirabilis but often cursed by airline pilots.

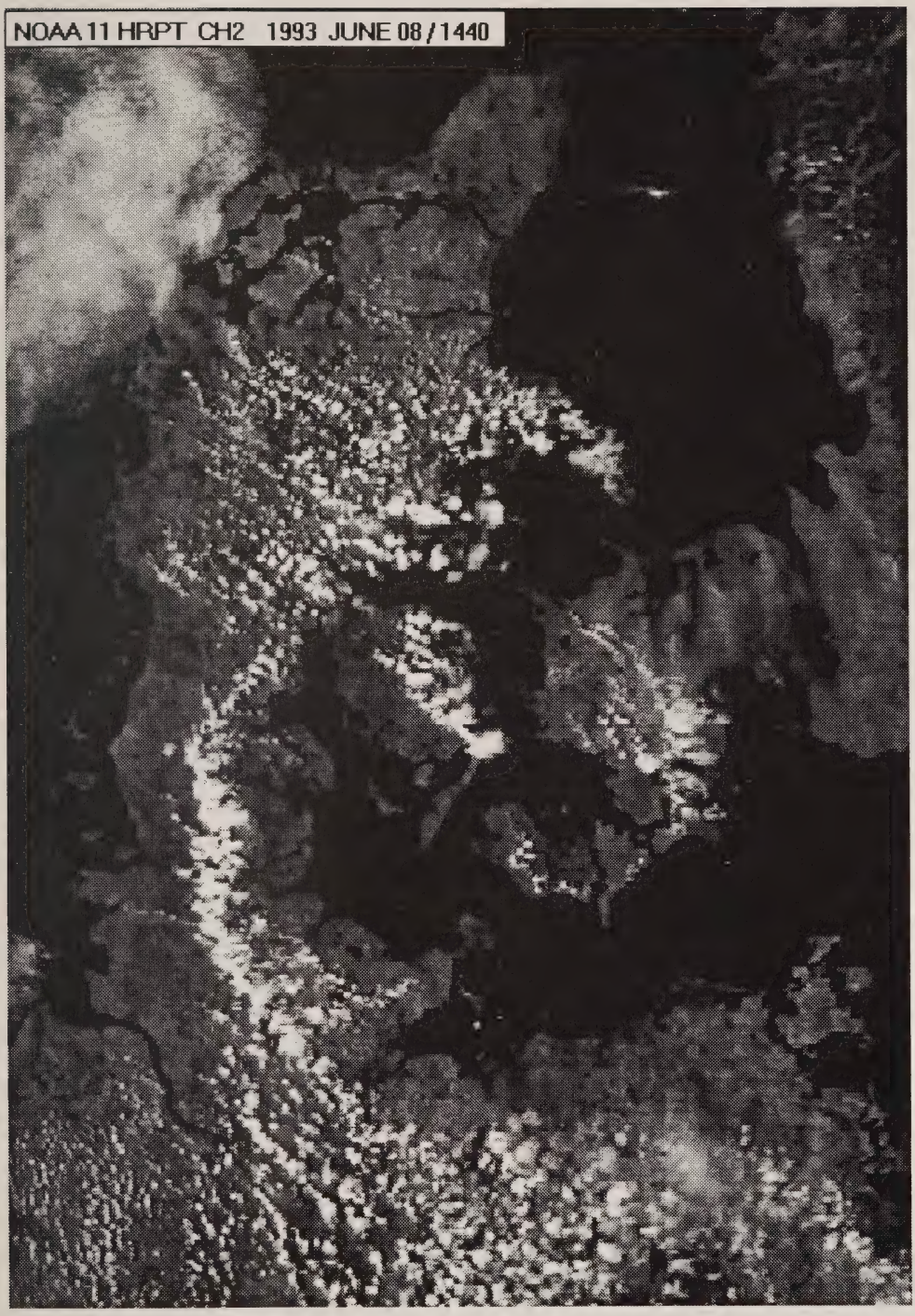
On days when air pressure is fairly uniform and winds are light, a local sea-breeze may be established near the coastline. This takes place in the following way. With clear skies the daytime land temperature rises very much more than that of the sea and so the air temperature over the land greatly exceeds that over the sea.

Vertical expansion causes pressure gradients to form at higher levels, above the surface, because more air will lie above a given level after the expansion than before and the resulting rise in pressure at that level over the land will cause a gradient such that the air flows gently from the land towards the sea. The removal of this air causes a pressure fall over the land, and a rise over the sea, resulting in a flow of air from sea to land.

The rising air over the land may reach a level where it is cool enough for its water-vapour content to condense out as clouds. A line of cloud often forms parallel to the coast along the "sea-breeze front" and can sometimes be seen on satellite images. Occasionally, showers can develop on the sea-breeze front and, very rarely, thunderstorms. As the sea-breeze develops it moves inland and on islands and narrow land areas breezes from opposite coasts can sometimes meet.

The accompanying image of Denmark illustrates this feature very well. The NOAA 9 pass some six hours earlier showed Denmark and Schleswig-Holstein to be cloud-free. However, by the time NOAA 11 passed over, close to the time of maximum heating, the sea-breezes from the east and west coasts had met to produce a line of very well developed cumulus clouds.

Most of the 1,100 cubic kilometres of water that falls as rain on our planet every day comes from evaporated sea-water. When a sea-breeze becomes established some of this moisture-laden air is carried well inland. Nocturnal cooling can result in this moisture condensing out as dew or fog.


NOAA 11 HRPT CH2 1993 JUNE 08 / 1440

My image of southern Africa was received on 24 February but for day after day, throughout the long summer, the images of this part of the world look broadly similar. For readers not familiar with images of southern Africa, apart from the obvious convective cloud in the north and east of the image, most of the colour differences over the land mass are due to land surface variations and not cloud.

Off the western coast lies the cold Benguela current. Air advected from adjacent, warmer water is cooled and extensive sea fog persists off the Namibian coast for about 8 months of the year. The local land-sea temperature difference in the daytime is extreme and, on occasions, the sea-breeze can become a sea-gale! These winds carry the moist sea air many kilometres inland and at night heavy dew and thick fog are common over an extensive area. The fog over land mostly evaporates by midday but, as my image shows, can linger all day along the coastal fringe. The following statistics show the effect well. All figures are averaged over the year. Luderitz Bay is on the coast and Windhoek is well inland and over 1500 metres above sea-level.

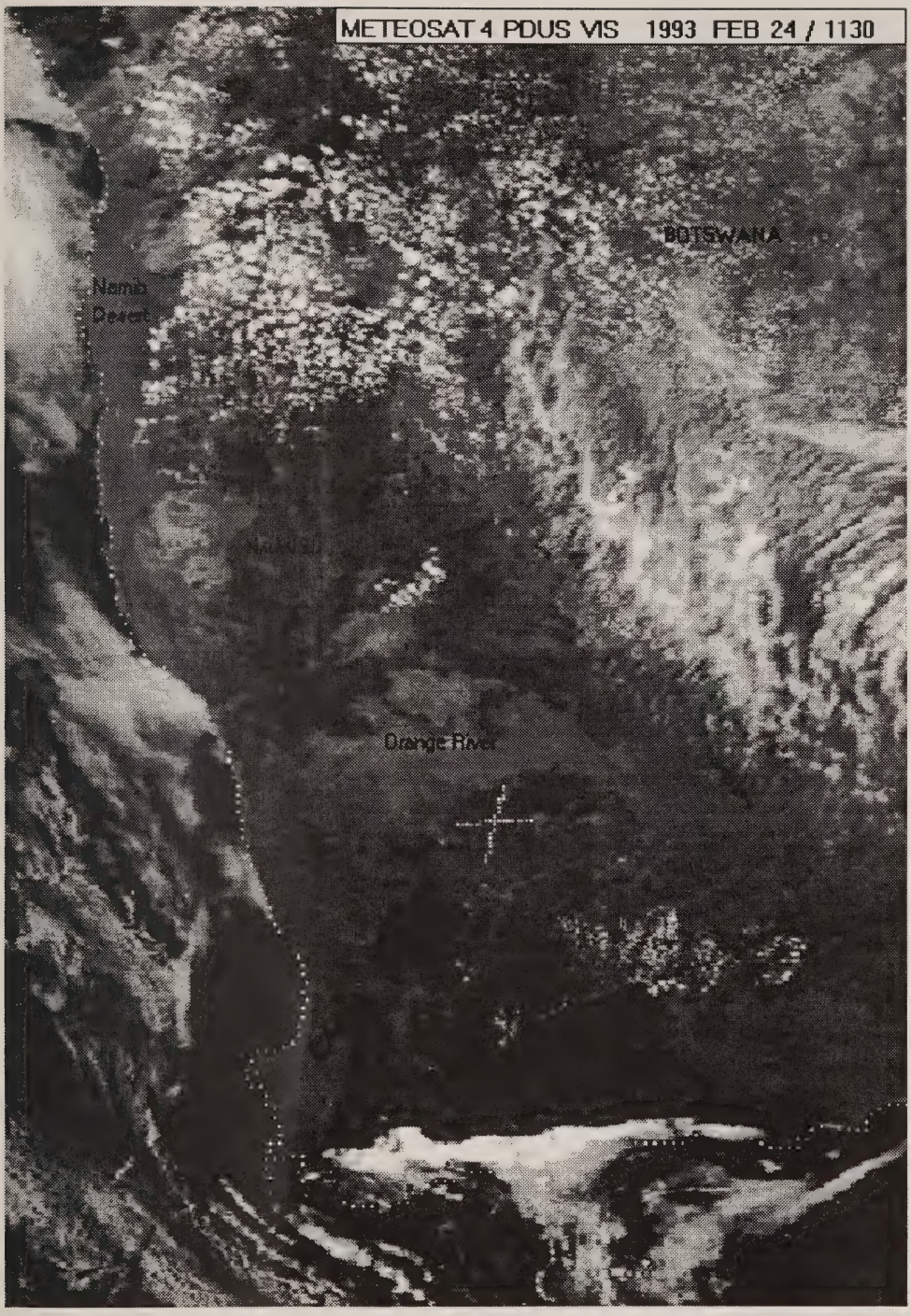
	Luderitz Bay	Windhoek
Daily maximum temperature	19.3	26.3
Relative humidity at 0700	86%	44%
Percentage of possible sunshine	54%	81%
Number of days with no sunshine	17	0

I am unable to find any fog statistics but the greatly reduced sunshine totals at Luderitz Bay are almost entirely due to morning fog which sometimes persists all day there.

Rainfall on the Namibian coast is virtually nil but the nocturnal fogs have been around for so long that several species of plants and animals have evolved which depend on them for their very existence. Welwitschia mirabilis is a plant endemic to the area. It has huge leaves covered with 20,000 pores per square cm on both surfaces to absorb moisture.

The image also shows an area of low cloud or fog along the southern Cape Province coast. This is probably caused by the same mechanism but is not a frequent occurrence along this coast.

Other places where the same mechanism produces widespread, coastal fog include the Atacama Desert, the Atlantic coast of Morocco and southern California. All these areas have cold ocean currents near the shore. The desert coastal region bordering the Persian Gulf are also very prone to thick


METEOSAT 4 PDUS VIS 1993 FEB 24 / 1130
BOTSWANA
Namib
Desert
Orange River

fog in the summer. There are no cold currents here but the problem arises from the very high sea temperatures. The shallow waters around Bahrain and Qatar can exceed 40 degrees in August and evaporate very rapidly. With such high water content very little nocturnal cooling of the air is needed to produce fog.

All the major airports in the region are situated on or near the coast and I shall never forget one stressful night-shift at Bahrain airport met. office. The sky was full of Jumbo-jets in need of re-fuelling and Dubai, Abu Dhabi, Doha, Dhahran, Bahrain and Kuwait airports were all fogbound. That was the night my hair turned grey!

WOT IS IT?

This recent photograph taken at our RIG conference has left the editorial team baffled.

Who is it, and what is he saying?

So we thought that we would let you the reader with your boundless imagination fit some words to make a suitable accompanying caption.

Employees of RIG and their families are not eligible to take part, unless they write in under an assumed name!!

One members wife has already suggested "I'm a little tea-pot", so that line's already gone!

Submissions need to be in time for the next edition, and should be no longer than about 20 words.

The Winner will get his or her RIG 1994 SUBS free!

RIG Competition... You supply the caption... What is Henry saying...

RIG CONFERENCE 1993

James Brown

For those of you with radios that pre-date OC71's, and can remember the delightful days when people had names, and not numbers, you will also recall that halcyon era when there were proper radio stations like Hilversum and Droitwich, instead of RADIO 1, or 3, which sound about as interesting as a P60! Well, for three blissful days, ancient and modern were combined as we returned to the hallowed ground of Daventry for the first UK Remote Imaging Conference of it's kind.

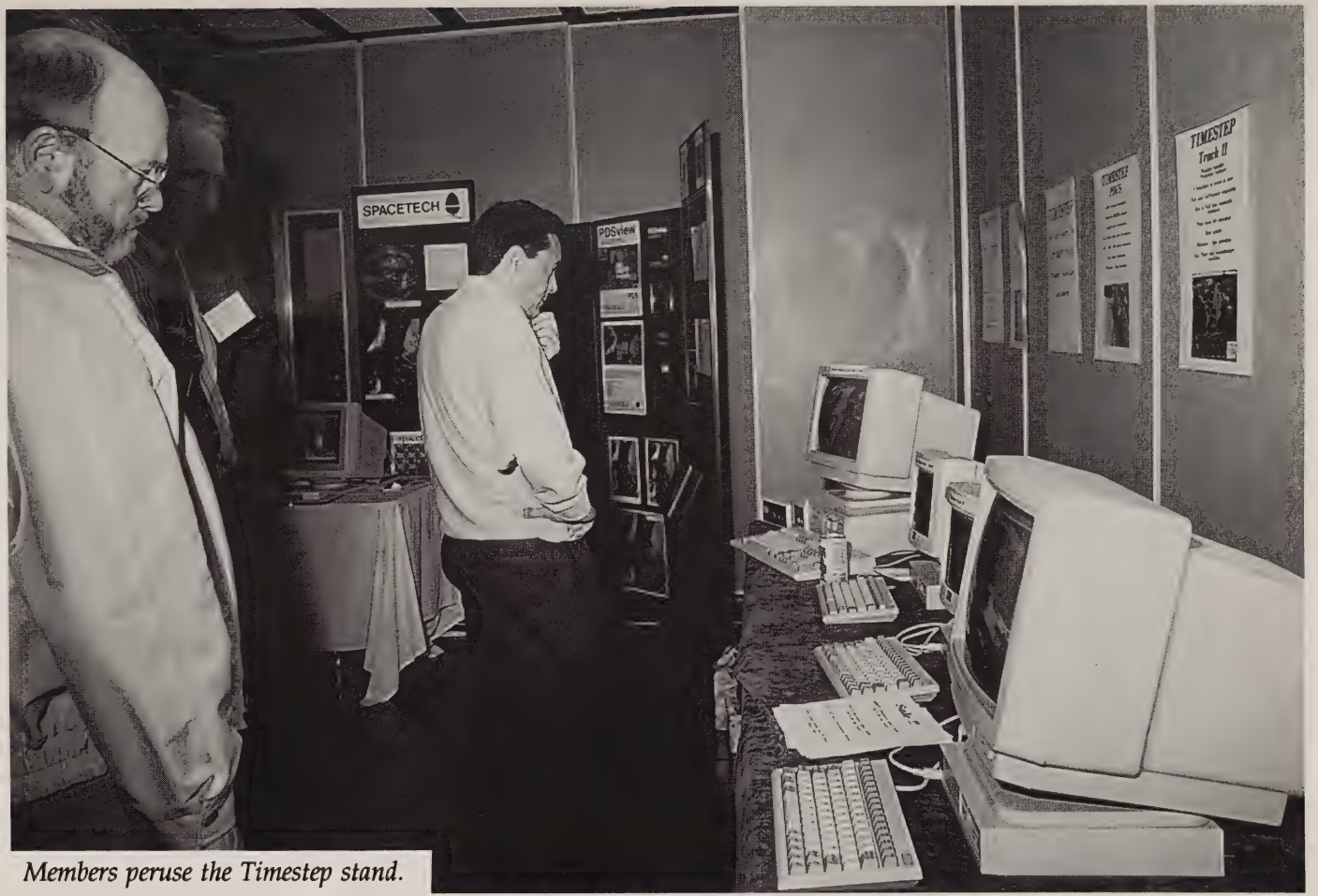
Under the watchful eye of those ancient antennas, about 120 enthusiastic Remote Imagers converged on the modern Britannia Hotel to enter a strange world where we ate, slept, and almost drowned in state-of-the-art satellite reception. In a packed programme competently masterminded and put together by Dave Cawley, we were given an audio-visual feast which by unanimous approval, more than justified the subsidised rate of £69 a head.

Beginners rubbed shoulders with the famous, identification tags were examined, and faces put to many a name. Conference members were drawn from afar afield as the USA, Canada, Spain, Italy, and even from Wales and Cornwall!

Our chairman Henry Neale kicked off the event with a raconteurs guide to the early days of Remote Imaging, and jaws visibly dropped at the sight of the Henry mast, a one time inhabitant of a corner of the Neale estate, which the BBC would have been proud to have owned. Rumours abounded that a satellite in a highly elliptical orbit had brought the mast to an untimely horizontal position.

Adjacent to the lecture room was the exhibition and main meeting area, where Timestep, Martelec, and Spacetech gave rolling demonstrations of their products to an appreciative and discerning audience. Everything could be seen and sampled, from SPOT and Landsat images, to Multi-spectral viewing, on machines as diverse as the Archimedes, the Amiga and the PC. The RIG stand was there of course, and so was a demonstration of the latest OFS satellite programme.

Once the ubiquitous slide projector had been tamed, Geoff Perry, a name synonymous with the Kettering Group, gave an authoritative lecture, largely based on the subject of the group's monitoring of the Soviet space



Members peruse the Timestep stand.

programme, past and present, and opened our eyes to the extent to which that programme is still intact.

The first evening ended delightfully, in the spacious and convivial surroundings of the hotel lounge and bar, where members, refreshments in hand, chewed the cud of satellite reception until the small hours. The air was full of musings upon the future path of remote imaging, and little groups hotly debated the pro's and con's of systems until sleep at last supervened.

The new day brought fresh offerings from our conference speakers, who without exception held our interest throughout the three days.

Jim Bacon was the human face of weather forecasting, and whether he was with his script or departing from it to answer questions, he was superb in opening up his subject. Who will ever forget his grave and highly technical description of the complex laws governing the tracks of depressions summed up as, 'When in doubt, assume it will turn to the left and slow down.'

Jim had a second bite of the cherry later in the day, when he lifted the curtain on the secret life of the television weather presenter, and left the conference awash in side-splitting humour, which brought the house down. We will never be able to think again of the serious work of the network of storm reporters, without remembering Jim's nickname for the many ladies who contributed, known in the office as the 'Thunderbirds'!

The standard of lecturing was very high, and John Dubois our next speaker succeeded in making us feel that any of us could have put together an HRPT station if we'd only tried hard enough. But we all recognised that behind the humbleness of his approach, and the simplicity of his explanations, was a lifetime of research and knowledge which surely makes him supreme in the amateur field, and the envy of many a professional. Some of us saw for the first time the late lamented FENG YUN's amazing multi-spectral capability, as the output from three channels were combined to give nearly natural full-colour images.

After coffee Christian Ripley from the National Remote Imaging Centre brought us down to earth with a bump, as we zoomed in to pixels just metres across, to examine the changing face of our world as seen by LANDSAT and SPOT.

John Dubois returned centre-stage to bring us the intricacies and eccentricities of GOES, VISSR & GVAR, all well illustrated by superb slides.

Jim Bacon at the weathermap.

At our recommencement after a more than adequate lunch a hush fell upon the conference as Dave Cawley's Timestep team attempted a live HRPT reception of a NOAA 11 pass. Monitors and an excellent colour projection system showed the prediction maps, and we waited with bated breath as the satellite drew ever closer.

Peter Arnold was responsible for manning the rotators on the 90cm dish, and no-one envied his task of manually tracking the satellite in front of such a gathering.

However, with only an occasional curse or two, he rode the HRPT bronco with great dexterity, and brought in a near faultless pass, until the surrounding buildings, brought his work to an end, and great interest was aroused in the ensuing image processing.

An ample meal brought an end all too quickly to another packed and fascinating day, but last was by no means least.

Steve Padar, another of our USA friends brought us again into the heady world of HRPT and PDUS, but this time from the aspect of their practical use. But before he had spoken Steven gave the ultimate accolade in admitting that the previous lecture by John Dubois on the subject of the USAF DMSP (Defence Military Satellite Project) programme, and his involvement in the Gulf War, alone made the conference worth coming to.

By the time we had felt the dust of Operation Desert Storm, and relived the events as seen through John's eyes, there really was nothing left to say.

For those of us who were present, we owe a huge debt of thanks to those who made the weekend possible, and such an enormously enjoyable and rewarding time.

Our lecturers are surely to be singled out for honest praise, well deserved, and so must our treasurer, Mark Clarke and his wife Janet who bore a big responsibility in sorting out the massive and complex financial side of our stay at the hotel, and the final word of congratulations must go to Dave Cawley, who we all recognised had helped pioneer another RIG first.

Every comment we've heard since has been to the effect. 'Don't change anything, and what are the dates for next year!'

Geoff Haito demonstrates the Amigasat system.

RUNNING A FAX PRINTER FROM A FRAMESTORE OR COMPUTER

Graham Smith

Last summer, when some 500rpm Mufax Courier printers were advertised in RIG newsletter very cheaply, I bought some of these to modify using toothed belts and toothed pulleys or gears. I've tried to find out from other RIG members if these machines can be interfaced to a framestore or computer, so that the picture, once displayed on the monitor, can be enhanced and printed out at the fax rate.

Video, laser and bubble jet printers cost hundreds of pounds, and a dot matrix printout is well below the quality of most screen pictures, so why not use a £10 surplus fax printer? After all, in the 60s, machines like this used to sit proudly on the top of some very expensive commercial APT systems.

After many enquiries, I discovered that no UK manufacturers that advertise in RIG newsletter or Short Wave magazine produce software or an add-on board, to make a computer put a suitable fax signal out, as "there is no demand". I find this rather hard to believe. They've taken all the trouble to make their systems do amazing things, yet none of them have combined this new technology with the old. Just think of all the unused machines in people's garages that could be dusted off and pressed into use. The computer is the perfect tool to get the very best out of the limited grey rendering of some printers.

Several people have suggested that I learn how to write my own software but they don't know me very well. I used to think that MSDOS kills 99% of all known germs! Anyway, it would be like learning the whole Chinese language just to order a takeaway: I'm not up to the job. There must be an easier way. Using a fax transceiver program in transmit mode may be the way, and there are various ones about now for the IBM and compatibles. A WRAASE SC1 SSTV/FAX transceiver is another alternative, I was offered one recently for £160. It can receive in SSTV and re-transmit in fax (or vice versa), and more usefully, receive at 240rpm and re-transmit at other speeds, maybe 500rpm if modified. No enhancement is available with this unit though, to my knowledge.

I talked to Peter Hayes and he suggested the following modifications to the YU3 UMV framestore. I don't pretend to understand it all, but other people may do and act upon it. His EPROM contrast enhancement article in RIG 30 is also worth looking at, as something similar appeared in "73" magazine in January 1988.

Did anyone ever try the UOSAT framestore (circa 1981) by Trevor Stockhill G3OQD? This was supposed to have had a fax output on it, as did "Storing Weather Pictures on Disk" by Emiliani, Pagnani and Righini in RIG 24.

Graham Smith, 3 Beech Hill Crescent, Mansfield, Notts., NG19 7EW

With permission from Peter Hayes...

"APT" type readout from a framestore works this way:

A framestore consists of an array of memory organised as (usually) 256 or 512 x (as much memory as you can afford so that you can store as much of the pass as possible). There are two column address generators and two row address generators.

When you are receiving the picture from a satellite, the digitised data from the A-D is written into the framestore, one address per cycle of the 2,400 Hz APT video signal using one of the column address generators.

Each satellite line increments one of the row address generators. Normally this matrix is read out at TV rate all the time using the other row and column address generators, and the APT write cycle is interleaved with the TV readout (during line blanking) so you see the image build up on the screen. When the APT data is being stored in any given memory location, the correct address is set up on the address bus, then the memory chips are given a "write" instruction (usually one pin is pulled low for a few microseconds) and the data is stored in the appropriate location.

However, were the "write" pulse not to happen, the memory would output the data currently in that location. If you can arrange for the "write" pulse to be removed from the memory array it can be used instead to latch the data on the data bus at that time, and this latched data, changing at APT rates, can be used to amplitude modulate a 2400 Hz carrier, and lo and behold, you have an APT type output from your framestore!

At least that's the theory. As I said on the phone, I haven't actually done this in practice, but there's no reason why it shouldn't work. Some work will be needed to include sync tones as well, but basically that's all there is to it, and should be relatively simple to implement.

OFS WEATHERFAX REVIEW

Ian Hanson

The OFS WeatherFAX system ver 5.0 offers a wealth of facilities for the reception and processing of weather satellite images together with the ability to receive fax charts with a short-wave radio. It consists of a high quality half card, two high density disks and a 57 page manual.

The software will work on any PC, 8088 upwards, with 640k of ram. However a 80386SX with 4 Meg of ram and SVGA are the recommended minimum. Expanded memory is used in order to work on pre 80386 machines. The system I use is a 80386 running Dos 5 with 8 Meg of ram, 330 Meg hard disk drive and a Genoa 7900 SVGA card.

I looked forward to testing this card to see how it compared with the Timestep Prosat II as the hardware/software is quite different, where it shows I will make a comparison.

Installation of the card is quite straightforward, there are no links or straps to change as the address is fixed at 3A6H and 3A7H with IRQ8. If you have any hardware that uses these addresses then you must change them and remove any TSR's that use IRQ8. The software installation was also straightforward and did not present any problems.

I started by looking at the various menus and then the supplied images, I could not view them in SVGA modes as I had forgotten to load the VESA driver. The software requires VESA compatibility so you MUST load the one supplied with your SVGA card or use one of the drivers supplied with the software. I found the number of mouse clicks required to go from one menu to another excessive. There is extensive on-line help available from all menus by pressing the F1 key.

I decided to test the system on the NOAA satellites first, I went to the receive menu, picked polar mode, accepted the defaults and then told it to capture the image. Next moment I was presented with the BIOS setup menu, the computer had crashed, I had to hit the reset button to recover. I tried this a number of times, with the same response - time to look at the autoexec.bat and config.sys files - got rid of smartdrive and rebooted. This time I got a bit further, to the receive screen, hit enter for manual start, the program started to sync to the satellite and then crashed. I tried this a number of times, the computer either crashed or cold booted. By this time the satellite was going

below the horizon, just as well, I needed the time to read the manual and scratch the head!

The read me file on one of the disks said the driver for the Mouse Systems mouse may not be compatible with some SVGA VESA boards, although I am using Microsoft mouse driver Ver 8.20 I deleted it from my config.sys, this worked and I can now receive pictures. After a couple of weeks of using this system with no mouse I had played around with autoexec.bat and config.sys to improve the performance of Windows 3.1. Trying this new set-up with WeatherFAX the mouse worked, this made the program easier to use.

Without trying this board on other systems or using another mouse I can't say whether this is a common problem, I would hope it isn't. I have never had any problems with any other software using the Microsoft driver.

The first time you receive a picture it will be skewed left or right as the computer timing has to be synchronised to the incoming picture. To do this you select 'page alignment' on the 'action line' at the bottom of the screen and use the left / right arrows to correct it. The Doppler bend will be apparent when you have done this, there is an option to correct this once the alignment has been set-up, it works well. If this sounds easy it wasn't, it took a few passes to get it right because of the slow keyboard response discussed further on.

This is where a major difference with Prosat II appears. Prosat II uses a phase locked loop to synchronise to the incoming signal and consequently has no timing or Doppler shift problems. WeatherFAX, however, uses straight demodulation followed by computer timed sampling of the signal. There is a large variation in timing between processor types, even two 80386's will be different because of variations in their crystals, thus the need to correct the skew. It is also the reason for the slow keyboard response. This technique of sampling may cause problems with tape recorded images, as any variation in speed cannot be followed by the hardware and may cause distortion of the played back image.

So what's the picture quality like? It's very good, I used the default of 840 samples per line for Meteosat and 2048 for NOAA's. This increased sampling rate for both types of satellite certainly improves the quality of the image, it is better than Prosat which is fixed at 600 and 1200 respectively and shows finer detail with a smoother image. The sampling rate can be increased up to 2048 but no further increase in detail is obtained as the defaults provide the maximum. e.g. Meteosat is specified at 800 pixels plus 40 for the sync.

The received pictures are saved to disk in GIF or TIF format. It takes time to convert them, Prosat on my system can save an image to disk in 5 seconds. The ability to read a GIF picture means it will also read any GIF, this could prove useful if you want to process a picture from some other source, the RIG library for instance.

Having received a picture you can go to the menu bar and pick 'view', the screen is re-drawn with the image you have just received. Tapping the space bar brings up another menu with a whole host of post processing facilities. All the usual ones are there, contrast stretching, brightness, 3D, zooming, gridding etc. all equivalent to the Prosat ones, plus some nice additions. I liked the ability to produce a map overlay on the NOAA pictures. If your clock is set accurately and you have up to date keplers the map overlay is spot on, you can test it first on the screen and save it to the file later if you are satisfied with it. You can also specify one or two geographical locations e.g. London and Reykjavik from any of the five you have pre-chosen, to improve the accuracy. This was very good and worked well.

A set of image enhancement curves are also available as is the ability to read temperatures on NOAA images, although this is not as easy to use as Prosat's, you have to align a vertical bar with the telemetry scale on the screen so the software can calibrate itself first before you can get a readout. You can flip between IR and VIS with single keystroke, which allows for easy comparison. Prosat requires two keystrokes and clears the screen between each redraw.

A major irritation to me of this system is the slow response of the keyboard (it is documented in the handbook) whilst receiving a picture, as it is only scanned at the end of each line, every half a second with NOAA. If you're like me you will tap the keys faster than that, with the result that the buffer fills up and causes the picture on the screen to jump out of line by one or two inches. This would not be a problem were it not fact that the program does not appear to remember the previously set contrast and brightness settings, when you receive a picture, go to 'view' to look at it in detail and then back to 'receive' to get a new picture. Very annoying, I spoilt many a picture trying to adjust the settings too quickly until I took a valium to slow me down! Even so there was still a sync loss of a couple of pixels. The only way around this is to leave all adjustments until you are in the view mode.

I did notice a vertical discontinuity in most of the NOAA pictures when zoomed in, presumably caused by writing the data to EMS or checking the keyboard. It was also visible on Meteosat pictures at the edge of the picture by the sync bars. When viewing pictures I found I could not page-up or

page-down to the very top or bottom of the picture I always had to go the last few steps using the up/down arrow keys. At the bottom of the receive screen is a bar graph display which appears to indicate the incoming signal level, which isn't documented.

Although WeatherFAX can print pictures to a dot matrix or laser printer, I could only test it with a 24 pin dot matrix. Picture quality is as good as you'll get from a dot matrix, with 64 grey levels available and only 4 printable it is obvious that quality will suffer, this applies to ALL programs, not just this one.

There is an option to use 16 half tones with a 4x4 matrix, with a laser printer this should produce very acceptable results. Having seen many weather pictures produced on photographic fax machines I find those produced (by any program) on dot matrix printers unacceptable. It's like comparing pictures on an SVGA display to those on CGA or a poor old BBC computer.

The schedule time facility allows you to capture images with unattended operation, you enter a start time, duration, and a name for the image. Only 24 times can be specified. When using this to set-up a Meteosat animation another problem showed up.

I set up the timer to receive D2 images one minute before start and six minutes duration, to allow for clock error. What I received was a sequence of scrambled pictures. I tried this a number of times with the same result each time.

WeatherFAX can also receive fax charts via short-wave radio, I did not test this to any extent but it seemed to work OK. It can also receive wire photos, GOES Tap data and control a short-wave receiver via the RS232 port, although I have no facilities to test these.

Another program can be run from the main menu without exiting to DOS. A shareware program Traksat is supplied, although you can use any. I got an 'insufficient memory' message when I tried to run this until I added the 'ram' option to the emm386 line in config.sys.

I use Windows with extended memory most of the time, so does most of the current software but his program uses expanded memory for pre 386 compatibility. A different autoexec.bat and config.sys are needed. You'll need a configuration manager program to ease the switching between the two set-ups.

To sum up then, I liked most of the facilities of this programme, the picture quality, map overlays and image processing. However what really bugged me was the slow keyboard response during picture reception. NOAA and Meteor pictures do not get centred on the screen during reception, centring them produces the same sync loss problems mentioned above, you could wait until all the picture was in but facilities are there and should work.

In contrast Prosat II with the animation program is so easy to set-up and use, and is more user friendly (except when adjusting the palette). WeatherFAX is $355 for a kit or $495 built. Upgrade options are available for users of earlier versions.

[Ed: We contacted OFS and invited them to comment on Ian Hanson's findings, as Mr Hanson is not the only one to encounter some of the problems mentioned above. Just before going to press we received an update of the software which is currently being evaluated]

RIG CONFERENCE 94

Due to the amazing success of this years conference (see James Brown's article page 20) we are considering either doing it all over again in 1994 as a 3 day residential conference or maybe just a one day show.

The location is undecided and could range from Manchester to Bristol or Cambridge to Watford.

This will be once again the opportunity to meet the World's experts in Remote Sensing and a chance to see all the commercial equipment you dream about, working live.

There will be plenty of time to sit in groups and reminisce about Framestores over a cup of tea or coffee. Maybe even a bring and buy stall ?

If you are interested please drop me a line and let me know what you think:

Sam Taylor, RIG, Fieldfare, Wickhambrook, Newmarket, CB8 8QA.

JVFAX v5.1 - A SECOND LOOK

Peter Dobson

Following Eberhard's article in RIG33 on his software I thought I would follow it up with further information on this excellent software package. Eberhard's article was more of a specification of the software he had written, what I want to do here is look in a little more detail at some of the many features and facilities offered by this very comprehensive programme.

First of all, some more points about how the software operates. One of the most important features about this software is that it stores pictures received in XMS memory. (For those with limited RAM in their machine, Version 5.2 of the software actually allows conventional memory to be used for picture storage.)

This is an extremely important feature of this software. It means that the resolution of the picture received and stored is not a function of the video graphics driver. That is, the resolution of the picture is the same whether you are using CGA, VGA or super VGA displays (or indeed Hercules). Most other software packages that I can think of use the Video memory to store the picture and, as a result, any subsequent processing of the picture is restricted by the resolution of the video driver being used. It also means that if you upgrade your PC at a later date any pictures received and stored before the upgrade will take full advantage of the video upgrade when it is incorporated.

In addition, one of the set up pages allows you, the user, to select how many pixels are allocated per line of the picture. This can be up to 1800 pixels per line. For Fax reception this sort of resolution is required, but of course it can result in large files stored to disk. The disk file size is also governed by the number of shades of grey which are also selectable by the user to make up the picture. So again for Fax reception there is no point in setting this variable above 16 as that is the highest number of shades of grey that are transmitted.

Another example is Meteosat. Here there is little point in defining more than 800 pixels per line as that is the transmission resolution for APT. Likewise, setting the shades of grey to anything above 64 would also be pointless for the same reason. By carefully choosing the picture characteristics to match that which is being received the disk file size will become the minimum for that quality of picture.

Another extremely important feature of the software is the ability to execute a DOS command after each picture is received. This is an extremely powerful

feature and allows all kinds of processing and reorganising of file or anything else between pictures by calling a batch file. This batch file can then call other programmes or routines that you might want to execute after receiving a picture. Used properly this feature is very powerful.

As you probably gathered from Eberhard's article, this programme is intended to cover all aspects of remote data reception including all APT formats and all Shortwave Fax formats. In addition, for the amateur radio enthusiasts out there, this programme will also decode slowscan TV. Finally, this programme will allow you to transmit APT or FAX format pictures to help you set up other equipment you may have in the shack.

The programme's ability to process received pictures is not vast. Nor, in my view, does it need to be. Because the basic picture format is GIF (by the way, you can also choose the format in which pictures are stored) there are many readily available programmes that can be used to post process pictures far better. To include such routines in JVFAX to my mind would simply be to reinvent the wheel.

The fast way to get going. - More recently in Version 5.2 Eberhard has been looking at including extra interface drivers. The interface drivers described in Eberhard's article will return the best results, but there are several short cuts to getting pictures out of the programme with very little effort. This then gives you the chance to play with the programme and use all its features.

For Facsimile reception the fast way to get going is to build the little comparator circuit described on page 40 of the JVFAX manual for Version 5.1 (The manual comes on the disk and is extremely thorough in it's presentation and description of the programme). This circuit comprises of a 741 op amp, a single resistor and a single capacitor. This, together with a 25 way or 9 way 'D' connector to interface to your PC serial port, is all that is required. Total assembly time should not be more than 10 minutes.

Connect the audio input of the op amp to a single sideband receiver output tune the receiver to any Fax station. (I use 134.2 KHz (DCF54) one of the better FAX stations I can receive without interference.) and with a bit of setting up in the configuration page and the mode selector page, pictures should be arriving.

If assembling the interface circuit is a problem don't panic, you still may be able to get going almost immediately. If you have a copy of: Skyview FAX (any version), John Hoot's PC-Goes or PC-HF Fax or PC Wefax or Elmer W.

Schwittek's Multifax programme, in fact any programme that uses the DSR line for data input. All these programmes will have arrived with a module that can be used with JVFAX.

Eberhard has gone further than this. In version 5.2 (currently on Beta release) the software recognises and works with the Digisat interface card sold by Martelec. This gives instant access to 64 shades of grey Meteosat and other APT pictures without having to build any interface circuitry at all.

The future also looks good for using other interface cards as well. Three that come to mind are Omnifax (Martelec) and Time Step's Prosat and PCWSAT III. I am sure with time this programme will work with more and more interface cards and modules from other products.

Clearly this is not intended to oust the other products as you would have needed to have bought these other products to obtain access to the interface card in the first place. What it does do is to allow a series of pictures to be received from a range of different sources all from one programme that can very easily be set up to run unmanned. For someone like myself, where the most interesting pictures arrive when I am either at work or fast asleep at home, this ability proves to be invaluable.

For a programme that is readily available from a number of sources at no purchase charge, but if you use it and like it, then a contribution to the author wouldn't go amiss, this programme beats all others hands down.

The ability to try it without forking out lots of money is in itself a very good thing to be able to do. If you don't like the programme then it may be that the programme is not configured to your liking. It is worth spending a bit of time on this programme because virtually every aspect of the operation of this programme can be configured by the user.

Martelec (just down the road from me) have expressed an interest in putting together kits for JVFAX to allow users to build up the circuits suggested by Eberhard on a proper PCB. Watch this space!!

I obtained my copy of version 5.1 through Amstrut who had a stand at the Sandown VHF convention in March this year. At the time all I paid was for the disk and copying fee ie £2.30. There is no doubt that this programme has a very good future and is well worth obtaining and supporting.

A SHORT REVIEW OF TH2SAT

Steve Stanley, G1EIV.

As many of you are aware there are quite a few systems of one sort or another now available for producing weather satellite images in conjunction with a computer. The particular system I would like to review is manufactured by TH2 IMAGING and is called TH2SAT.

My interest in weather sat reception started some two years ago, and over the years I have tried various other systems including a BBC computer and a framestore. After many months of deep thought and saving I purchased a 386sx25 PC, only to be thrown into confusion again with all the wxsat systems being recommended to me. However I decided to go for the TH2 system; at the time it seemed good value for money. (Basic PC286 is the minimum requirement, and speed is not important but super VGA is advantageous.)

When I received the system I did think the circuit board looked a little Heath Robinson and the board was a tight fit in the expansion slot in the computer but nevertheless it did work. After a phone call to the chaps at TH2, to explain the problem I had encountered, and a couple of days later, I received another card that was professionally made and fitted the slot perfectly.

The setting up of the software could not have been easier, I am by no means an expert when it comes to computers and found the accompanying manual very straight forward. The step by step instructions soon had me selecting a video card to match my machine (11 different types catered for) and also confirmed my base address selection. A quick press of the return key and I was in business.

First I started experimenting with the three video modes, which gave me 300*200 pixel resolution on standard vga, 640*480 on super vga, and 1024*768 on high resolution super vga. These gave an image file size from 59,282Kb to 739Kb.

The program caters for all satellite modes e.g, METEOSAT, NOAA etc, in visible or infra red with the inclusion of the crystal synchronisation and input level, the latter being adjustable whilst receiving a satellite signal.

All of the five main menus are selected by "Function" keys 1 to 5 and each operation within a particular menu again is controlled by a single stroke of a key.

There are many things that can be done to an image once it is on the screen by means of the image processing menu which includes, to name only a few: 3D projection, image flip, high and low pass filtering and being able to produce a negative image. Image colouring is achieved by use of the palette menu, each colour being added or changed by key stroke selection. Other facilities within the software include, image animation, unattended operation, picture show and a PCX utility program.

Considering it is only a two man team, without big company money, (enthusiasts) that have turned out a good system, my hat is off to them. I have found the system to be very powerful whilst being user friendly, simple to operate, and I have produced some very good images with it. I hope this review gives a reasonable insight into TH2SAT and what it can do.

TH2SAT can be obtained from: TH2 IMAGING, 34 Princes Gardens, Margate, Kent. CT9 3AR. Tel 0843-223831 / 596256.

And the price is £100 inc. VAT + p&p.

FOR SALE...

ProsatII Card & disks £80 Dave Cressey, 8 Parklands Drive, HARLAXTON, Grantham, Lincs, NG32 1HX Tel: 0476 75789

INFO...

Henry tells us that from time to time second hand Framestores become available. If you are in the market for one of these please ring him for details.

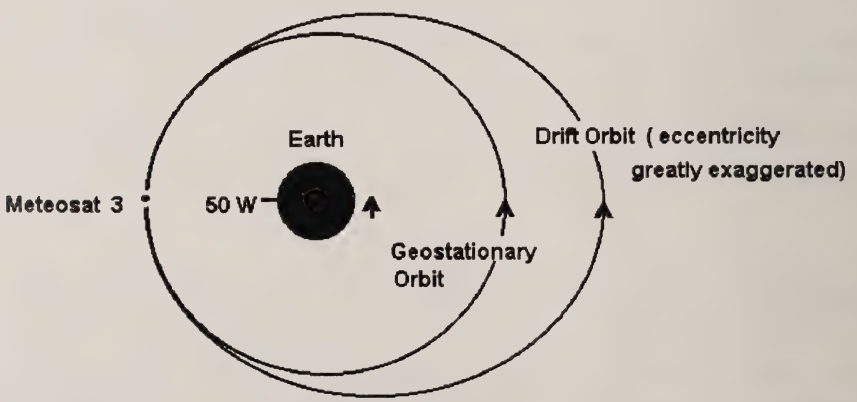
HOW METEOSAT 3 WENT WEST

Peter Wakelin

By now most readers will be aware that Meteosat 3 was moved from 50 to 75 degrees west earlier this year, but how was the move achieved? Was it simply given a nudge in a westerly direction? No. It was actually pushed to the EAST!

Let me explain with the help of a diagram showing a view of Earth and Meteosat's orbit from high above the north pole. Satellites in geostationary orbit complete one revolution of the Earth in the same time as the Earth revolves once on its axis, ie 23 hours 56 minutes. (It has to turn for another 4 minutes to bring the Sun back to the same position in the sky because of the Earth's orbital motion.)

The satellite's velocity in this orbit is about 3074 metres/second towards the east. On 27 January thrusters were activated to increase this speed by about 3 m/s. This pushed Meteosat 3 into a larger, slightly elliptical orbit. In this new "drift-orbit" Meteosat 3 took about 4 minutes longer to complete one revolution. In those extra 4 minutes the Earth turned an additional one degree so by the time Meteosat 3 had completed one drift-orbit longitude 51 degrees west lay beneath it. After another 22 orbits the satellite was over 75 degrees west and its velocity was reduced for it to revert to geostationary orbit.

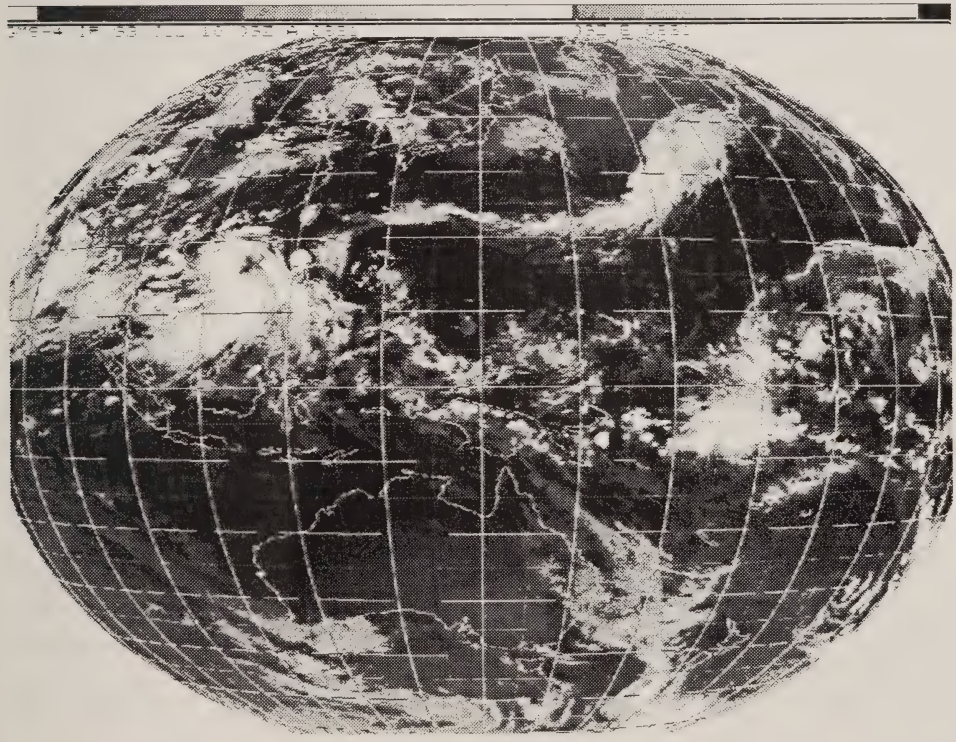


NEW METEOSAT GMS RELAY

James Brown

From July 7th, EUMETSAT began operating a new schedule, S9307/M02 which included not only a new hourly PDUS LXI transmission, but also for the first time, relays from GMS-4, the Japanese Geostationary satellite located at approximately 140 degrees east, longitude. These are shown on the new schedule as GMSA-D. The four frames are IR quadrants of the complete earth disk, out to about 60 degrees in either direction from the sub-satellite point. There is a large amount of overlap between the frames, resulting in New Guinea appearing in them all!. The picture quality is somewhat degraded in comparison to other METEOSAT transmissions, and the transmission lines employed only allow a five bit data rate transmission, corresponding to some 32 grey levels. In the accompanying picture we have mated the quadrants to show the overall view. For those with the right equipment, consecutive frames are animatable, and amongst other things to look out for, the area around the equator is prone to hurricanes, or typhoons as they are called in that part of the world.

PICTURE OF GMS WHOLE IMAGE



ENCRYPTION OF METEOSAT HIGH RESOLUTION IMAGE DATA
A Eumetsat Statement

EUMETSAT is currently developing the design of the HRI encryption infrastructure. It is expected that the first data encryption module will be implemented at the primary Meteosat uplink in Germany by the beginning of 1994. More details can be found within the EBB in the Section E - Registered Users or F - Guest Users, submenu B - Meteosat Operational News.

[For those who are not familiar with the terms... HRI is what we know as PDUS, and Meteosat analogue WEFAX is Meteosat reception, as on ProsatII, PCwSAT3, Amigasat, etc. There are no known plans to alter any of the Noaa or Russian Meteor series transmissions. Mike]

Encryption of Meteosat High Resolution Image Data

For the encryption of Meteosat High Resolution Image (HRI) data, EUMETSAT is currently developing the design of the HRI encryption infrastructure. It is expected that the first data encryption module will be implemented at the primary Meteosat uplink in Germany by the beginning of 1994. Regular transmissions of encrypted HRI formats will continue from Meteosat-4, 5 or 6 throughout 1994 and 1995. HRI transmissions will be routinely encrypted beyond 1995, during the period of the Meteosat Transition and Meteosat Second Generation Programmes.

In October 1992 all registered manufacturers of PDUS stations were informed about EUMETSAT's intention to encrypt HRI data in order that the necessary interfaces for the PDUS decryption unit can be developed by each manufacturer. Full technical details of the Meteosat HRI encryption infrastructure were distributed during March 1993 to all registered manufacturers and to the National Meteorological Services of EUMETSAT Member States, who have the responsibility for the onward distribution of this information to authorized users within their territory. If you wish to apply for a copy of this documentation and you reside in one of the EUMETSAT Member States, you should, contact your National Meteorological Service at the address shown on the attached sheet. If you do not reside in one of the EUMETSAT Member States, you should contact EUMETSAT for further information, at the address shown below. Furthermore, you should contact your manufacturer for further details on the installation of a decryption key unit within your particular ground station. Details on key unit costs will be provided in due course.

For the time being, Meteosat analogue WEFAX dissemination will not be encrypted. However, at the present time a definition of a digital Low Rate Image Transmission (LRIT) format is in progress and which will be agreed with our international partners within a year. It will most likely become the standard low rate image format provided by our Meteosat Second Generation (MSG) Programme, commencing around the year 2000, as a replacement to the present WEFAX formats. Periodic test transmissions of this new format can be expected before this date, however, users will be kept informed about progress in Newsletters, electronic mail, etc.

You will also find enclosed a summary of the current EUMETSAT data distribution and charging policy applicable to both digital and analogue Meteosat imagery. For more detailed information please contact EUMETSAT at the address shown.

DISTRIBUTION AND CHARGING POLICY
Applicable to the Reception of Digital or Analogue METEOSAT Imagery

The distribution and charging policy related to the analogue and digital imagery of METEOSAT was agreed by the EUMETSAT Council in 1988. The fundamental principle is that each Member State is in charge of the distribution and charging within its own territory.

The Member State thus has the right to independently decide whether reception of the analogue data by SDUS or the digital data by PDUS is associated with the payment of fees, and if so, the amount of fees to be paid.

Outside the territories of the its Member States, EUMETSAT takes responsibility for data distribution and charging. EUMETSAT is also responsible for data distribution and charging if the use of data involves a number of States, of which at least one is a non-EUMETSAT Member State.

Please note, therefore, that if you intend to receive analogue or digital imagery from METEOSAT, permission from EUMETSAT should be sought if you're outside the EUMETSAT Member States, or from your national meteorological service if your are a user within one of the EUMETSAT Member States. In each case a fee may be payable. In the former case please apply directly to The Director, EUMETSAT at the address shown below. In the latter case please apply in the first instance to the Director of the relevant Meteorological Service.

The Director, EUMETSAT, Am Elfengrund 45, 6100 Darmstadt, GERMANY

The Director, Institut Royal Mtorologique, Ringlaan 3, 1180 Brussels, BELGIUM

The Director, Danish Meteorological Institute, Lynbyvej 100, 2100 Kobenhaven 0, DENMARK

The Director' Finnish Meteorological Service, Vuorikatu 24, P.O.B. 503, 00101 Helsinki 10, FINLAND

The Director, Mtorologie Nationale, 77 rue de Svre, 92106 Boulogne Billancourt, FRANCE

The Director, Deutscher Wetterdienst, Zentralamt, Frankfurter Str. 135, Postfach 10 04 65, 6050 Offenbach, GERMANY

The Director, Hellenic Meteorological Service, Glyfada PO TTS, East Airport Hellinikor, Athens, GREECE

The Director, Meteorological Service, Glasnevin Hill, Dublin 9, IRELAND

The Director, Italian Meteorological Service, Piazzale degli Archivi, 34, 00144 Rome, ITALY

The Director, Koninklijk Nederlands, Meteorologisch Instituut, Postbus 201, 3730 AE De Bilt, NEDERLANDS

The Director, Det Norske Meteorologiske Institute, P.O.B. 320 - Blindern, 0314 Oslo 3, NORWAY

The Director, Inst. Nacional de Meteorologica, e Geofisica, Rua C - Aeroporto, 1700 Lisboa, PORTUGAL

The Director, Instituto Nacional de Meteorologia, Ciudad Universitaria, Paseo de Las Moreras S/N, Apartado 285, 28003-Madrid, SPAIN

The Director, Swedish Meteorological and, Hydrological Institute, P.O. B. 923, 60176 Norrkping, SWEDEN

The Director, Inst. Suisse de Mtorologie, Krhbhlstr. 58, 8044 Zrich, SWITZERLAND

The Director, Devlet Meteorologji Isleri Genel, Mdr, P.K. 401, Ankara, TURKEY

The Director, Meteorological Office, London Road, Bracknell, Berkshire, RG12 2SZ, UNITED KINGDOM

THE KETTERING GROUP EXPERIENCE

G E Perry, MBE

The Kettering Group

A Summary of the talk given at the RIG Residential Conference '93, 21 May 1993.

By mid-1966 Derek (G3FOZ) Slater's CR-100 was showing signs of its age and we were looking for another receiver. I was in regular contact with the satellite prediction service operated by the Radio & Space Research Station at Ditton Park near Slough. At some date between 13 and 22 July, during the School's summer vacation, we went to the R&SRS with a view to obtaining a receiver on long term loan. In their store room we spotted an Eddystone 770R which, for many years, had done yeoman service in the Falkland Islands, and persuaded them that it would serve admirably as a backup for the CR100. Initially it was used to receive 40 MHz signals from the recoverable Cosmos reconnaissance satellites which we were already monitoring on 20 MHz.

Derek persuaded Jaybeams of Northampton to design and construct for us a six-element 137 MHz crossed Yagi antenna for the basic cost of the aluminium and this was used for weather satellites and the British Prospero, often hand-held or, for initial AOS, merely propped up on a laboratory stool at the appropriate azimuth. Our logs show that Derek recorded our first weather satellite signals from the newly-launched ESSA 4 on 6 February 1967.

Several images were obtained by photographing the screen of a cathode ray oscilloscope in a darkroom with the shutter of a Zeiss Nettar 2¼" x 2¼" camera open for 200 s with the recorded signal applied to the X-plates and a 200 s vertical time-base applied to the Y-pates. Once we had obtained recognisable images (less than 1" in frame-width) we abandoned the projected and concentrated on monitoring the Cosmos programme, leaving weather pictures to others. Slides were shown of the Eddystone 770R, a schoolboy clad in oilskins and souwester manually steering the Yagi, an image from Nimbus 2, rev 6312, 1 September 1967 and the corresponding weather map from the *Daily Telegraph* for 3 September 1967.

Being interested in the operational status of all Soviet satellite systems, we recorded our first Meteor signals from 10th Meteor on 3 February 1972 and, thereafter, our pupils monitored 137 MHz together with the usual shortwave transmissions during their pre-morning school, lunch hour and vacation sessions. Despite my reluctance I gradually came round to Derek's suggestion of widening our frequency horizons.

The worldwide publicity which we received at the end of 1966 following the disclosure of the use and location of the third Soviet launch site at Plesetsk to the south of Archangel and in October 1967 for the Cosmos 186/188 mission led to contacts which proved to be mutually beneficial to us and to our correspondents. We were often able to identify the sources of signals from which people were receiving imagery and other data.

After reading an article in the October 1976 "*CQ*" by Dr Lindsay Winkler, of Walla Walla, Washington, USA, I asked Ian Reid, one of our pupils, to check the source of an image of the west coast of the USA. He disagreed with the author's identification as the 23rd Meteor. After checking that he was correct, I wrote to tell Winkler that he had copied signals from the first Meteor-2. This led to a prolonged correspondence, one result of which was that, in 1977, he sent me an image of the eastern USA from the 28th Meteor, recorded by Ken Johnson in Austin, Texas. That was the first of the Soviet retrograde launches. The image had a 1-minute numerical telemetry frame along one side. Immediately above a grey-density step-wedge was a number which increased by one every frame. The obvious conclusion that this was a clock-count was hard to reconcile with the fact that it was 350 minutes "fast" with respect to GMT.

Gerry Kennedy was present when I showed the slide at Southampton later that year and disagreed with my interpretation of a clock. As I had only the one image from which to work he offered to provide me with a log of his observations of the value over a period. Until he went on vacation at the beginning of August 1977 the value was GMT+350 min. However, although he hadn't noticed it, when he resumed observations in mid-September it had been re-set to GMT+180 min, or Moscow Standard Time.

Meteor-2 imagery had black lines of varying thickness and position in place of the numerical edge-code. We were able to show that this was a representation of a binary read-out. Changes in the value of the edge-code coincided with noticeable banding of image intensity and it was shown that it was a measure of "aperture setting" to provide constancy of sensor illumination.

The "wide open" value of 63 occurred close to the terminator and observations from Greg Roberts in South Africa and Len Maxim in New Zealand, together with Peter Wakelin's from all over the world, showed that the maximum "stopped down" value of 10 occurred when the sub-satellite point was close to the sub-solar latitude, at which time the binary edge-code disappeared completely.

Dissemination Schedule S9307M02 - METEOSAT 4

valid from 8 July 1993 0900 UTC (Channel A1 = 1691 MHz - Channel A2 = 1694.5 MHz)

HH	00				03				06				09				12				15				18				21				HH
MM	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	MM
2	D1	48	AI	48	D1	6	AI	6	C02	12	AIVH	12	C02	18	AIVH	18	C02	24	AIVH	24	C02	30	AIVH	30	D1	36	AIVH	36	D1	42	AIVH	42	2
6	D3	48	AI	48	D3	6	AI	6	C03	12	AIVH	12	C03	18	AIVH	18	C03	24	AIVH	24	C03	30	AIVH	30	D3	36	AIVH	36	D3	42	AIVH	42	6
10	D4	48			D4	6			D1	12	AIVH	12	D1	18	AIVH	18	D1	24	AIVH	24	D1	30	AIVH	30	D4	36	AIVH	36	D4	42	AIVH	42	10
14	D5	48	DTOT	48	D5	6	DTOT	6	D3	12	DTOT	12	D3	18	DTOT	18	D3	24	DTOT	24	D3	30	DTOT	30	D5	36	DTOT	36	D5	42	DTOT	42	14
18	D6	48	ETOT	48	D6	6	ETOT	6	D4	12	ETOT	12	D4	18	CTOT	18	D4	24	CTOT	24	D4	30	CTOT	30	D6	36	ETOT	36	D6	42	ETOT	42	18
22	D7	48			D7	6			D5	12			D5	18	ATEST	1	D5	24	*	*	D5	30			D7	36	WEFA		D7	42	ATEST	1	22
26	D8	48	GMSA	48	D8	6	GMSA	6	D6	12	GMSA	12	D6	18	ATEST	1	D6	24	GMSA	24	D6	30	GMSA	30	D8	36	WEFA		D8	42	ATEST	1	26
30	D2	1	BIW	1	D2	7	BIW	7	D2	13	BIV	13	D2	19	BIV	19	D2	25	BIV	25	D2	31	BIV	31	D2	37	BIV	37	D2	43	BIW	43	30
34	D9	1	AI	1	D9	7	AI	7	C02	13	AIVH	13	C02	19	AIVH	19	C02	25	AIVH	25	C02	31	AIVH	31	D9	36	AI	37	D9	43	AI	43	34
38	D1	1	AI	1	D1	7	AI	7	C03	13	AIVH	13	C03	19	AIVH	19	C03	25	AIVH	25	C03	31	AIVH	31	D1	37	AI	37	D1	43	AI	43	38
42	D3	1	AW	1	D3	7	AW	7	C3D	13	AIVH	13	C8D	19	AIVH	19	C3D	25	AIVH	25	C8D	31	AIVH	31	D3	37	AW	37	D3	43	AW	43	42
46			AW	1			AW	7	C2D	13	AW	13	C9D	19	AW	19	C2D	25	AW	25	C9D	31	AW	31			AW	37			AW	43	46
50			GMSB	48			GMSB	6	D3	13	AW	13	C2D	19	AW	19	C1D	25	AW	25	D3	31	AW	31			GMSA	38			GMSA	42	50
54			LXI	1			LXI	7	D1	13	LXI	13	D1	19	LXI	19	D1	25	LXI	26/26	D1	31	LXI	31/32			LXI	37/38			LXI	42/43	54
58	D2	2	BIW	2	D2	8	BIW	8	D2	14	BIVW	14	D2	20	BIVW	20	D2	26	BIVW	26	D2	32	BIVW	32	D2	38	BIVW	38	D2	44	BIW	44	58

HH	01				04				07				10				13				16				19				22				HH
MM	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	CH	A1	CH	A2	MM
2	D1	2	AI	2	D1	8	AI	8	C02	14	AIVH	14	C02	20	AIVH	20	C02	26	AIVH	26	C02	32	AIVH	32	D1	38	AIVH	38	D1	44	AI	44	2
6	D3	3	AI	2	D3	8	AI	8	C03	14	AIVH	14	C03	20	AIVH	20	C03	26	AIVH	26	C03	32	AIVH	32	D3	38	AIVH	38	D3	44	AI	44	6
10			LY	1	E1	8	LY	7	D7	14	AIVH	14	D7	20	AIVH	20	D7	26	AIVH	26	D7	32	AIVH	32	E1	38	AIVH	38			LY	43	10
14			LR	1	E2	8	LR	7	D8	14	LY	13	D8	20	LY	19	D8	26	LY	25	D8	32	LY	31	E2	38	LY	37			LR	43	14
18			GMSC	48	E3	8	GMSC	6	D9	14	LR	13	D9	20	LR	19	D9	26	LR	25	D9	32	LR	31	E3	38	LR	37			AVHRR		18
22			GMSD	48	E4	8	GMSD	6	D3	14	AVHRR		D3	20	AVHRR		D3	26	LZ	25	D3	32	LZ	31	E4	38	LZ	37			GMSB	42	22
26					E5	8					GMSB	12			GMSA	18			GMSB	24			GMSB	30	E5	38	GMSB	38			GMSC	42	26
30	D2	3	BIW	3	D2	9	BIW	9	D2	15	BIV	15	D2	21	BIV	21	D2	27	BIV	27	D2	33	BIV	33	D2	39	BIV	39	D2	45	BIW	45	30
34	D1	3	AI	3	D1	9	AI	9	C03	15	AIVH	15	C03	21	AIVH	21	C03	27	AIVH	27	C03	33	AIVH	33	D1	39	AIVH	39	D1	45	AI	45	34

RIG
CONFE

NOAA 9 PERIOD 101.93 MINS FREQUENCY 137.62MHz

TIME OF ACQUISITION OF SIGNAL - 52.5 DEG NORTH 0 DEG EAST

14/09	08.33	20.06	17/10	08.11	19.44	19/11	09.31	19.22
15/09	08.20	19.53	18/10	09.40	19.31	20/11	09.18	19.09
16/09	08.07	19.40	19/10	09.27	19.18	21/11	09.05	18.56
17/09	09.36	19.27	20/10	09.14	19.05	22/11	08.52	18.43
18/09	09.23	19.14	21/10	09.01	18.52	23/11	08.39	20.12
19/09	09.10	19.01	22/10	08.48	18.39	24/11	08.26	19.59
20/09	08.57	18.48	23/10	08.35	20.08	25/11	08.13	19.46
21/09	08.44	18.35	24/10	08.22	19.55	26/11	09.42	19.33
22/09	08.31	20.03	25/10	08.09	19.42	27/11	09.29	19.20
23/09	08.18	19.50	26/10	09.38	19.29	28/11	09.16	19.07
24/09	08.05	19.37	27/10	09.25	19.16	29/11	09.03	18.54
25/09	09.34	19.24	28/10	09.12	19.03	30/11	08.50	18.41
26/09	09.21	19.11	29/10	08.59	18.50	01/12	08.37	20.10
27/09	09.08	18.58	30/10	08.46	18.37	02/12	08.24	19.57
28/09	08.55	18.45	31/10	08.33	20.06	03/12	09.53	19.44
29/09	08.42	18.32	01/11	08.20	19.53	04/12	09.40	19.30
30/09	08.29	20.01	02/11	09.49	19.40	05/12	09.27	19.17
01/10	08.16	19.48	03/11	09.36	19.26	06/12	09.14	19.04
02/10	09.45	19.35	04/11	09.23	19.13	07/12	09.01	18.51
03/10	09.31	19.22	05/11	09.10	19.00	08/12	08.48	20.20
04/10	09.18	19.09	06/11	08.57	18.47	09/12	08.35	20.07
05/10	09.05	18.56	07/11	08.44	20.16	10/12	08.22	19.54
06/10	08.52	18.43	08/11	08.31	20.03	11/12	09.50	19.41
07/10	08.39	20.12	09/11	08.18	19.50	12/12	09.37	19.28
08/10	08.26	19.59	10/11	09.46	19.37	13/12	09.24	19.15
09/10	08.13	19.46	11/11	09.33	19.24	14/12	09.11	19.02
10/10	09.42	19.33	12/11	09.20	19.11	15/12	08.58	18.49
11/10	09.29	19.20	13/11	09.07	18.58	16/12	08.45	20.18
12/10	09.16	19.07	14/11	08.54	18.45	17/12	08.32	20.05
13/10	09.03	18.54	15/11	08.41	20.14	18/12	08.19	19.52
14/10	08.50	18.41	16/11	08.28	20.01	19/12	09.48	19.39
15/10	08.37	20.10	17/11	08.15	19.48	20/12	09.35	19.26
16/10	08.24	19.57	18/11	09.44	19.35	21/12	09.22	19.13

MORNING PASSES ARE SOUTHBOUND EVENING PASSES ARE NORTHBOUND

NOAA 10 PERIOD 101.12 MINS FREQUENCY 137.50MHz

TIME OF ACQUISITION OF SIGNAL - 52.5 DEG NORTH 0 DEG EAST

14/09	06.34	18.01	17/10	06.41	18.08	19/11	06.48	16.34
15/09	06.10	17.37	18/10	06.17	17.44	20/11	06.23	17.51
16/09	07.26	17.13	19/10	07.33	17.20	21/11	05.59	17.26
17/09	07.02	16.48	20/10	07.09	16.55	22/11	07.16	17.02
18/09	06.38	18.05	21/10	06.45	18.12	23/11	06.52	16.38
19/09	06.14	17.41	22/10	06.21	17.48	24/11	06.27	17.55
20/09	07.30	17.16	23/10	07.37	17.23	25/11	06.03	17.30
21/09	07.06	16.52	24/10	07.13	16.59	26/11	07.20	17.06
22/09	06.42	18.09	25/10	06.49	16.35	27/11	06.55	16.42
23/09	06.17	17.45	26/10	06.24	17.52	28/11	06.31	17.58
24/09	07.34	17.20	27/10	06.00	17.27	29/11	06.07	17.34
25/09	07.10	16.56	28/10	07.17	17.03	30/11	07.24	17.10
26/09	06.46	18.13	29/10	06.53	16.39	01/12	06.59	16.45
27/09	06.21	17.49	30/10	06.28	17.56	02/12	06.35	18.02
28/09	07.38	17.24	31/10	06.04	17.31	03/12	06.11	17.38
29/09	07.14	17.00	01/11	07.21	17.07	04/12	07.27	17.14
30/09	06.50	16.36	02/11	06.57	16.43	05/12	07.03	16.49
01/10	06.25	17.53	03/11	06.32	17.59	06/12	06.39	18.06
02/10	06.01	17.28	04/11	06.08	17.35	07/12	06.15	17.42
03/10	07.18	17.04	05/11	07.25	17.11	08/12	07.31	17.17
04/10	06.54	16.40	06/11	07.00	16.47	09/12	07.07	16.53
05/10	06.29	17.56	07/11	06.36	18.03	10/12	06.43	18.10
06/10	06.05	17.32	08/11	06.12	17.39	11/12	06.18	17.46
07/10	07.22	17.08	09/11	07.29	17.15	12/12	07.35	17.21
08/10	06.57	16.44	10/11	07.04	16.50	13/12	07.11	16.57
09/10	06.33	18.00	11/11	06.40	18.07	14/12	06.47	16.33
10/10	06.09	17.36	12/11	06.16	17.43	15/12	06.22	17.49
11/10	07.26	17.12	13/11	07.32	17.19	16/12	05.58	17.25
12/10	07.01	16.47	14/11	07.08	16.54	17/12	07.15	17.01
13/10	06.37	18.04	15/11	06.44	18.11	18/12	06.50	16.36
14/10	06.13	17.40	16/11	06.20	17.47	19/12	06.26	17.53
15/10	07.30	17.16	17/11	07.36	17.22	20/12	06.02	17.29
16/10	07.05	16.51	18/11	07.12	16.58	21/12	07.19	17.05

MORNING PASSES ARE SOUTHBOUND EVENING PASSES ARE NORTHBOUND

NOAA 11 PERIOD 101.97 MINS FREQUENCY 137.62MHz

TIME OF ACQUISITION OF SIGNAL - 52.5 DEG NORTH 0 DEG EAST

14/09	04.54	14.45	17/10	04.53	14.44	19/11	04.53	14.44
15/09	04.41	14.32	18/10	04.41	14.32	20/11	04.40	14.31
16/09	04.29	14.20	19/10	04.29	14.20	21/11	04.28	16.01
17/09	04.17	15.50	20/10	04.16	15.49	22/11	04.16	15.49
18/09	04.04	15.37	21/10	04.04	15.37	23/11	04.03	15.36
19/09	03.52	15.25	22/10	03.51	15.24	24/11	05.33	15.24
20/09	05.22	15.13	23/10	05.21	15.12	25/11	05.20	15.11
21/09	05.09	15.00	24/10	05.09	15.00	26/11	05.08	14.59
22/09	04.57	14.48	25/10	04.56	14.47	27/11	04.56	14.47
23/09	04.44	14.35	26/10	04.44	14.35	28/11	04.43	14.34
24/09	04.32	14.23	27/10	04.32	14.23	29/11	04.31	14.22
25/09	04.20	15.53	28/10	04.19	15.52	30/11	04.18	15.51
26/09	04.07	15.40	29/10	04.07	15.40	01/12	04.06	15.39
27/09	03.55	15.28	30/10	03.54	15.27	02/12	05.36	15.27
28/09	05.25	15.16	31/10	05.24	15.15	03/12	05.23	15.14
29/09	05.12	15.03	01/11	05.12	15.03	04/12	05.11	15.02
30/09	05.00	14.51	02/11	04.59	14.50	05/12	04.58	14.49
01/10	04.47	14.38	03/11	04.47	14.38	06/12	04.46	14.37
02/10	04.35	14.26	04/11	04.34	14.26	07/12	04.34	14.25
03/10	04.23	14.14	05/11	04.22	15.55	08/12	04.21	15.54
04/10	04.10	15.43	06/11	04.10	15.43	09/12	04.09	15.42
05/10	03.58	15.31	07/11	03.57	15.30	10/12	03.57	15.30
06/10	05.28	15.19	08/11	05.27	15.18	11/12	05.26	15.17
07/10	05.15	15.06	09/11	05.15	15.06	12/12	05.14	15.05
08/10	05.03	14.54	10/11	05.02	14.53	13/12	05.01	14.52
09/10	04.50	14.41	11/11	04.50	14.41	14/12	04.49	14.40
10/10	04.38	14.29	12/11	04.37	14.28	15/12	04.37	14.28
11/10	04.26	14.17	13/11	04.25	15.58	16/12	04.24	15.57
12/10	04.13	15.46	14/11	04.13	15.46	17/12	04.12	15.45
13/10	04.01	15.34	15/11	04.00	15.33	18/12	03.59	15.32
14/10	03.49	15.22	16/11	05.30	15.21	19/12	05.29	15.20
15/10	05.18	15.09	17/11	05.17	15.08	20/12	05.17	15.08
16/10	05.06	14.57	18/11	05.05	14.56	21/12	05.04	14.55

MORNING PASSES ARE SOUTHBOUND EVENING PASSES ARE NORTHBOUND

NOAA 12 PERIOD 101.30 MINS FREQUENCY 137.50MHz

TIME OF ACQUISITION OF SIGNAL - 52.5 DEG NORTH 0 DEG EAST

14/09	07.39	19.08	17/10	07.29	18.58	19/11	07.19	18.47
15/09	07.18	18.46	18/10	07.08	18.36	20/11	08.38	18.25
16/09	08.37	18.24	19/10	08.27	18.14	21/11	08.16	18.04
17/09	08.15	18.03	20/10	08.05	17.52	22/11	07.55	17.42
18/09	07.54	17.41	21/10	07.43	19.12	23/11	07.33	19.01
19/09	07.32	19.00	22/10	07.22	18.50	24/11	07.11	18.39
20/09	07.10	18.38	23/10	08.41	18.28	25/11	08.30	18.18
21/09	08.30	18.17	24/10	08.19	18.06	26/11	08.09	17.56
22/09	08.08	17.55	25/10	07.57	17.45	27/11	07.47	19.15
23/09	07.46	19.14	26/10	07.36	19.04	28/11	07.25	18.53
24/09	07.24	18.53	27/10	07.14	18.42	29/11	08.45	18.32
25/09	08.44	18.31	28/10	08.33	18.21	30/11	08.23	18.10
26/09	08.22	18.09	29/10	08.12	17.59	01/12	08.01	17.48
27/09	08.00	17.47	30/10	07.50	17.37	02/12	07.39	19.07
28/09	07.38	19.07	31/10	07.28	18.56	03/12	07.17	18.46
29/09	07.16	18.45	01/11	07.06	18.35	04/12	08.37	18.24
30/09	08.36	18.23	02/11	08.26	18.13	05/12	08.15	18.02
01/10	08.14	18.01	03/11	08.04	17.51	06/12	07.53	17.40
02/10	07.52	17.40	04/11	07.42	19.10	07/12	07.31	19.00
03/10	07.31	18.59	05/11	07.20	18.49	08/12	07.09	18.38
04/10	07.09	18.37	06/11	08.40	18.27	09/12	08.29	18.16
05/10	08.28	18.15	07/11	08.18	18.05	10/12	08.07	17.54
06/10	08.07	17.54	08/11	07.56	17.43	11/12	07.45	19.14
07/10	07.45	19.13	09/11	07.34	19.03	12/12	07.23	18.52
08/10	07.23	18.51	10/11	07.12	18.41	13/12	08.43	18.30
09/10	08.42	18.30	11/11	08.32	18.19	14/12	08.21	18.08
10/10	08.21	18.08	12/11	08.10	17.57	15/12	07.59	17.46
11/10	07.59	17.46	13/11	07.48	19.17	16/12	07.37	19.06
12/10	07.37	19.05	14/11	07.27	18.55	17/12	07.16	18.44
13/10	07.15	18.44	15/11	07.05	18.33	18/12	08.35	18.22
14/10	08.35	18.22	16/11	08.24	18.11	19/12	08.13	18.00
15/10	08.13	18.00	17/11	08.02	17.50	20/12	07.51	17.39
16/10	07.51	17.38	18/11	07.41	19.09	21/12	07.30	18.58

MORNING PASSES ARE SOUTHBOUND EVENING PASSES ARE NORTHBOUND

ENCE
1993

42			E6	9			D1	15	AIVH	15	D1	21	AIVH	21	D1	27	AIVH	27	D1	33	AIVH	33	E6	39	AIVH	39			GMSD	42	42
46		WEFA	E7	9			D3	15	GMSC	12	D3	21	GMSB	18	D3	27	GMSC	24	D3	33	GMSC	30	E7	39	GMSC	36					46
50		WEFA	E8	9					GMSD	12	C1D	21	GMSC	18	C1D	27	GMSD	24	C1D	33	GMSD	30	E8	39	GMSD	38					50
54		• •	E9	9	•	•	C2D	15	•	•	C2D	21	•	•	C2D	27	•	•	C2D	33	•	•	E9		•	•			•	•	54
58	D2	4 BIW 4	D2	10	BIW	10	D2	16	BIVW	16	D2	22	BIVW	22	D2	28	BIVW	28	D2	34	BIVW	34	D2	40	BIW	40	D2	46	BIW	46	58

HH	02		05		08		11		14		17		20		23		HH
MM	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	CH A1	CH A2	MM
2	D1 4	AI 4	D1 10	AI 10	C02 16	AIVH 16	C02 22	AIVH 22	C02 28	AIVH 28	C02 34	AIVH 34	D1 40	AI 40	D1 46	AI 46	2
6	D3 4	AI 4	D3 10	AI 10	C03 16	AIVH 16	C03 22	AIVH 22	C03 28	AIVH 28	C03 34	AIVH 34	D3 40	AI 40	D3 46	AI 46	6
10	TEST	AW 4	ADMIN	AW 10	C3D 16	AIVH 16	C3D 22	AIVH 22	C3D 28	AIVH 28	C1D 34	AIVH 34	TEST	AW 40	ADMIN	AW 46	10
14		AW 4		AW 10	TEST	ADMIN	C4D 22	GMSD 18	C4D 28	ADMIN	C4D 34	TEST		AW 40		AW 46	14
18		ADMIN		TEST			ADMIN	TEST	TEST		ADMIN			ADMIN		TEST	18
22																	22
26																	26
30	D2 5	BIW 5	D2 11	BIW 11	D2 17	BIV 17	D2 23	BIV 23	D2 29	BIV 29	D2 35	BIV 35	D2 41	BIW 41	D2 47	BIW 47	30
34	D1 5	AI 5	D1 11	AI 11	C02 17	AIVH 17	C02 23	AV 23	C02 29	AIVH 29	D1 35	AIVH 35	D1 41	AIVH 41	D1 47	AI 47	34
38	D3 5	AI 5	D3 11	AI 11	C03 17	AIVH 17	C03 23	AV 23	C03 29	AIVH 29	D3 35	AIVH 35	D3 41	AIVH 41	D3 47	AI 47	38
42			E1 11		C5D 17	AIVH 17	E1 23	AV 23	C5D 29	AIVH 29	E1 35	AIVH 35		AIVH 41	E1 47		42
46			E2 11		C6D 17	WEFA	E2 23	AV 23	C6D 29	WEFA	E2 35			WEFA	E2 47		46
50			E3 11		C7D 17	WEFA	E3 23	AV 23	C7D 29	WEFA	E3 35			WEFA	E3 47		50
54	CTH 4	• •		• •	CTH 16	• •		AV 23	CTH 28	• •		• •	CTH 40	• •		• •	54
58	D2 6	BIW 6	D2 12	BIVW 12	D2 18	BIVW 18	D2 24	BIVW 24	D2 30	BIVW 30	D2 36	BIVW 36	D2 42	BIW 42	D2 48	BIW 48	58

AI HRI Full Disk IR
AIVH HRI Full Disk IR & Half Res VIS
AW HRI Full Disk WV
AV HRI Full Disk Full Res VIS
Lxx METEOSAT-XADC relay transmission (uplinked by CMS)
LXI HRI format (odd slots contain IR data, even slots contain VIS data)
LZ, LR, LY WEFAX formats
GMSx GMS WEFAX relay transmission (uplinked by CMS Lannion, 5 bit resolution)

BIW HRI European sector IR & WV
BIV " " " IR & Full Res VIS
BIVW " " " IR, WV & Half Res VIS
ATEST HRI Test Pattern
WEFA WEFAX meteorological chart, to be discontinued on 1/8/93 0h UTC

Cnn WEFAX VIS Full Res
CnD WEFAX VIS Half Res
Dn WEFAX IR
En WEFAX WV
CTH WEFAX processed Cloud Top Height
xTOT WEFAX Full Disk
AVHRR WEFAX processed AVHRR
ADMIN WEFAX Administration Message
TEST WEFAX Test Pattern

Slides were shown of a Meteor image recorded by Peter Baylis in Dundee on 9 September 1972, an image of eastern USA from the 28th Meteor, and a Meteor-2 image of Scandinavia by Peter Wakelin.

It is of interest to consider the types of spacecraft and launch vehicle with which we are dealing. The Meteor programme was initially tested within the Cosmos programme - Cosmos being a coverall name to hide military missions and partial failures. To begin with, Meteors were launched from Plesetsk by the Vostok booster - the same type as used to launch Yuri Gagarin. It was also used from Tyuratam for the retrograde sun-synchronous launches. The launch profile of the Vostok with its radio guidance involves a near vertical ascent. At 2153 GMT on 14 May 1981, Suzanne Hultmann, a student at the University of Umea, Sweden, on the west coast of the Gulf of Bothnia was on the roof of the Physics Department when she observed a bright light rising in the eastern sky which arced over and disappeared to the north. By good fortune she was able to capture the phenomenon on 35 mm colour film. I was able to show that she had observed the launch of the 7th Meteor-2 and her photograph was subsequently published in *Aviation Week & Space Technology*, on 18 January 1982. The next Meteor-2 launch in March 1982 signalled the change to the Tsiklon booster. Its inertial guidance and different launch profile is not conducive to observations from Umea although missile test launches from Plesetsk occasionally still give rise to UFO reports from Sweden.

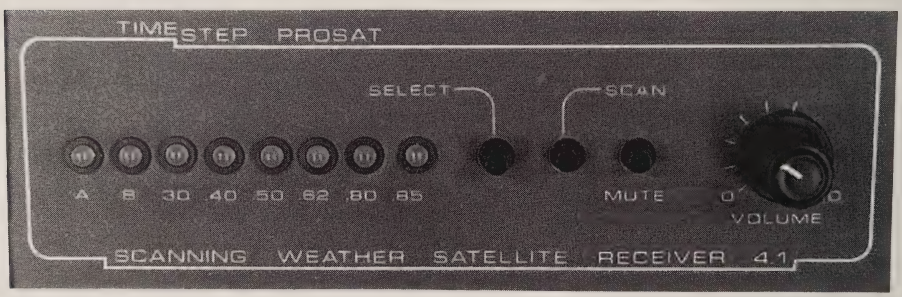
Slides were shown of Cosmos 144 at Earls Court in 1968; a Meteor in the Museum of Economic Achievement, Moscow; the scanning mirror of a Meteor at the Paris Air Show in 1977; a Meteor-2 in the Museum of Economic Achievement, Moscow; the Vostok 1 launch from Tyuratam; Suzanne Hultmann's photograph of the 7th Meteor-2 launch; and a Tsiklon on the launch pad at Plesetsk.

In August 1984, Grant Zehr sent me a combined visible and radar image with a numerical edge-code from Cosmos 1500 which he had received from Marciano Righini in Ravenna, Italy. It was labelled "1557:35-1603:38 GMT, northbound, 10 August 1984" and Marciano had kindly marked "NORTH". The image was totally unrecognisable. A large white area bore some resemblance to the Caspian Sea but a thorough search of a large map of Europe provided no further clues. I then realised that the Moscow Time from the edge-code did not correlate with the reception time; 876 implied 1436 Moscow Time or 1136 GMT, some 260 min or 2½ orbits earlier - i.e. southbound! The Commodore 4032 placed it over Texas on the terminator. Inverting the picture immediately showed the white area to be the Yucatan peninsular in Central America. This was the first example of "stored image" transmission that we had seen.

Slides were shown of Cosmos 1500 at the Paris Air Show in 1985; Marciano's image - as received and inverted; and a Cosmos 1766 image of Gulf of Bothnia by Adrian Buchan of Brixham, showing the numerical edge code, visible, microwave sounder and synthetic aperture radar images.

I wish to thank my colleagues and pupils at the Kettering Grammar (Boys) School, friends in the Kettering Group, and all the others who, over many years, have furthered my research by providing images, observations, equipment, labour, criticism and advice.

RIG-TIMESTEP PROscan POLAR RECEIVER



A professionally made scanning receiver covering all NOAA and Soviet Polar Orbiting Satellites. The frequency can be readily seen via an LED on the front panel and unwanted channels can be locked out. It is designed with a lot of internal filtering, making it ideal for locations that suffer from Pager problems. It is resistant to pager interference at 1 to 2 miles (where the field strength is at maximum), and also carries an unconditional money back guarantee. *See RIG32 page 88 for further details.*

For the latest prices of the above equipment see Rig Shop Corner

A HYPERMEDIA WEATHER DATABASE

Simon Williams

29th June 1993

The following sets the concept for, and detail of my interactive, multi-media, weather database for use as a class teaching aid or for individual study. I have worked from the hypotheses that;

The weather is a complex, multi-faceted phenomenum, about which we have many different kinds of information available. As teachers we need new information handling tools to enable our students to access, and learn from, the rich sources of information available. These tools should develop students' information handling skills.

Initial Concept:
To utilise the interactive and multimedia capabilities (sound, text, graphics, animation) of the personal computer to compile onto CD-ROM a hypermedia database of weather information.

The content of the disk covers, at a level suitable for both Key Stages 3 and 4 (GCSE), the following aspects of meteorology;
Frontal systems
High and low pressure areas
Major air streams
Clouds and precipitation

Specific Objectives:
1) To provide a learning environment within which students will be enabled to perceive relationships between different data sets in such a way that they understand the basic meteorological mechanisms and their associated effects, in ways not possible with conventional teaching methods.

2) To provide a means of storing, cataloguing and displaying in meaningful ways;
Weather satellite images
Weather station readings
Weather charts
Shipping forecasts
Newspaper reports
Photographs
Video

Implementation:
Almost any of the currently available multi-media authoring package could have been used but Digithurst's "Picture book" program, running under Microsoft Windows was, at the time, the simplest to do this task. It enables the creation of a truly interactive, multi-media, database, and learning environment. Each screen has "buttons" on it which allow the user to go to other related pages. In some cases images on a page have "buttons" hidden behind them that can, when selected, reveal further screens or pages of information, allowing the images to be interrogated. Buttons are also programmed to run other applications such as animation and sound playback. Images used have been taken direct from a satellite receiver, captured from video tape and, in the case of weather charts, scanned in from paper based media. Animated sequences are played in a window on the screen.

The database contains the following information;
Weather Satellite images. (NOAA, METEOSAT)
Weather station readings.
Met. Office weather charts.
Met. Office shipping forecasts.
Written and spoken descriptions, commentaries and explanations.
Colour diagrams, some animated.
Video images of local weather and cloud types.

For example; The section on weather fronts has an entry page giving the user the choice of which type of front or frontal system they wish to investigate.

Having selected the cold front button the screen shows a satellite image of a cold front together with buttons which lead on to other pages containing;

The chart for that picture.
An animated satellite sequence of a cold front passing.
A set of measurements taken from around the area of the cold front.
A series of photographs of the weather as experienced on the ground.
Some hypertext describing the formation and associated weather of a cold front.
A diagram of a cold front in vertical section.
Animated pages showing the synchronised changes in the satellite image, chart, measurements, map and ground based photographs.

Whichever of these buttons is selected it will lead to a page on which there are similar buttons. This allows the user to quickly flick between pages about the same phenomenum and hence see the connections between the data-sets.

Whether this is between the satellite image and the weather chart or between the weather chart and the ground based photographs, etc.. In addition to the buttons listed above there is one which will give a spoken commentary and three others which allow the user to navigate their way around the environment.

In the Classroom:
There is a need, at this time in the U.K., since the introduction of the Science and Geography National Curricula, for meteorology teaching resources which are accessible by teachers of other specialisms. The flexibility of the program is such that it enables teachers to adopt a variety of teaching strategies using the same resource.

There are three main possibilities;
1) To use the database as a hypermedia, learning environment.
2) To use the database as an animated, multi-layer chalk-board.
3) To use the database as a primary information source.

Materials already exist for classroom activities based upon the kind of material provided in this database. What they do not provide is the range of data that is in this database nor the ability to view the different data sets interchangeably with ease, or to view data sets simultaneously. Thus this database is a powerful resource in it's own right which can also be used as a complimentary resource with materials such as the GCSE resource pack "Using Weather Satellite Images", Stanley Thornes (1991)

Future Development:
The completed program is planned for publication in early 1994 on CD-ROM.

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Simon Williams, 6 Hawke Rd., Kewstoke, W-S-M, BS22 9LB

A PRACTICAL LINK BUDGET ANALYSIS

Roger Belcher

I have had the idea for some time to write an article that discusses antennas, propagation, noise, bandwidth etc. and that is readable, informative and has a useful outcome, but then I am an optimist. There are already many books, papers, articles etc. on these topics but they are frequently discussed using a very heavy mathematical content and give little practical conclusions. The other type of article is often purely anecdotal and again gives little usable information.

To be really useful I felt the article should give an explanation of the subject and also serve as a source of reference when actually designing or putting a practical system together. The aim is to consider what the antenna does in our application, how noise occurs in the system and for a conclusion tells us what noise/gain performance we need for a particular receiver to suit a specific antenna, or alternatively having already a system with a particular noise figure tells us how to choose a compatible antenna. I will say at once that no information offered here is original or new, just presented in a relevant way - I hope! You can, at this point, jump directly to the last part headed APPLICATION if you want to use only the results.

The system we are considering is that of a satellite gathering environmental data (weather etc) transmitting that information to a ground receiving station consisting of an antenna, a receiver and demodulator and an output module (VDU, plotter etc).

Let us consider two functions of the satellite.

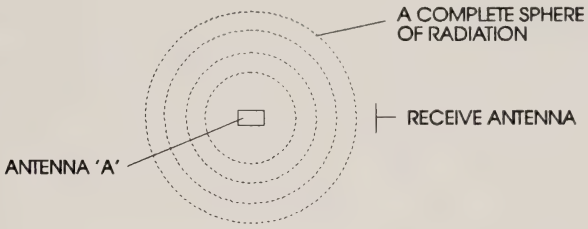
The first part, the transmitter has the job of generating an R.F. carrier (e.g. Meteosat at 1.7GHz) modulating the data onto this carrier, using Automatic Picture Transmission (APT) format and then amplifying this modulated carrier up to the power level to be transmitted. The second part to consider is the antenna. This has the job of taking the power from the transmitter and "launching" it into space. Let us look at the antenna in a little more detail.

The first point to understand is that the antenna is a passive device, it cannot increase the power supplied to it by the transmitter. It does not have a power gain. However, we talk about the gain of an antenna, so what do we mean?

If R.F. power is supplied to an antenna that radiates this power equally in all directions, we would have the power spreading out in a complete sphere.

We say such an antenna (ant A) is radiating ISOTROPICALLY. If we position a receiving antenna some distance from this transmitting antenna we will receive some of the transmitted power:

Fig.1



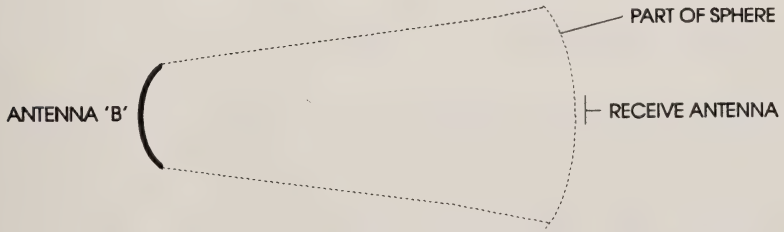
We can see that the percentage of total transmitted power we receive is very very small - most of it goes in the wrong direction!

power received = receiving antenna size/surface area of sphere at receiving radius

We say that the flux density (power per unit area) at the receive antenna is very low. We can, however, use a transmitting antenna that will radiate the available power in a more "focused" beam. An antenna often used at microwave frequencies to perform this function is a parabolic dish.

If we look at the dish we see that it is radiating the transmitter power in a beam. N.B. No additional power is being transmitted, it is just being focused or concentrated in one direction. We can see the benefit of this at our receiving antenna.

Fig.2



As before,

power received = Receiving antenna size / Surface area of "part sphere"

The effectiveness of Antenna B is measured by the power focusing effect over Antenna A (the isotropic radiator). This increase of its effectiveness is referred to as its "gain". This is usually expressed in dBi (dB relative to an isotropic radiator). To obtain the same flux density at the receiving antenna using antenna A as we receive in the case of Antenna B we would have to increase the transmitter power dramatically. This use of the comparison of the antenna "intensification" effect and the power needed to provide a particular field strength coverage is called the EQUIVALENT or EFFECTIVE ISOTROPIC RADIATED POWER, the E.I.R.P.

E.I.R.P. is the product of the satellite R.F. power and the gain of the antenna and is expressed in dB Watt (dBW). 0dB equals 1 Watt. It can also be considered as the power required by the isotropic radiator to give the same received power.

As a dish is also a frequently used antenna for the ground receiving station we need to consider its gain in more detail. The gain of a dish is proportional to its diameter and inversely proportional to the received (or transmitted) wavelength.

i.e. $Ga = e(\pi D/\lambda)^2$
or in dBi = 10logGa EQN 1

Where	e = efficiency (where 1 = 100%)
	D = diameter of the dish in metres
	λ = wavelength in metres
	= c/f
where	c = 3E8 (speed of light m/sec.)
and	f = 1.6945E9 (Meteosat freq. in Hz.)
so	λ = 0.177 metres

An interesting and significant factor is e - the efficiency of the antenna. e can include such factors as dish parabola accuracy, pointing accuracy, etc. These factors also apply to the transmit antenna. Satellite link designers typically use a figure of 0.5 (50%), whereas Broadcast satellite dish installers work with a figure nearer to 0.8 (80%). A practical figure to work with for amateur Meteosat installations would be 0.7 (70%). Table 1 shows antenna gain listed against diameter at 1.7 GHz for efficiencies between 50% and 80%.

TABLE 1

ANTENNA GAIN IN dBi (AND DIRECT) BY EFFICIENCY AND DIAMETER

DISH DIA.(M)	1.5	1.3	1.2	1.0	0.9	0.8	0.7	0.6	
EFF (e)									
0.8	27.53	26.29	25.60	24.01	23.01	22.07	20.91	19.58	dBi
	556.8	425.7	362.7	251.9	283.4	161.2	123.4	90.70	
0.7	26.95	25.71	25.02	23.43	22.52	21.49	20.33	19.00	dBi
	496.0	372.5	317.4	220.4	178.6	141.1	108.0	79.40	
0.6	26.28	25.04	24.35	22.76	21.85	20.82	19.66	18.33	dBi
	425.1	319.3	272.0	188.9	153.1	120.9	92.60	68.00	
0.5	25.49	24.25	23.55	21.97	21.06	20.03	18.87	17.53	dBi
	354.3	266.1	226.7	157.5	127.6	100.8	77.20	56.70	

The table may not give an immediate impression of the importance of this difference in effectiveness. However, it is telling us that a 1m dish 80% efficient has a gain of 24 dB. To achieve the same gain at 50% efficiency would require a dish of nearly 1.3 m diameter. i.e. a flat area increase of 68%. I am sure most wives would consider the difference very significant especially when the dish (the antenna of course!) is sitting on the patio.

It may be thought that to increase the power received at a particular point on the earth's surface the satellite designer can simply increase the transmit antenna diameter. The problem is that the larger the diameter, the more the focusing effect, i.e. the narrower the beam. The system designer will be required to provide his transmitted service over a certain area on the earth's surface. If the beam is too narrow, i.e. the dish too large, the surface covered will be too small, the satellite service will have a small footprint.

If we consider the ground station antenna a different situation applies. Here we are trying to capture as much signal as possible and so we should present as large a window or aperture as possible. The power so captured is then focused onto the antenna elements i.e. the larger the dish the stronger the received signal power.

So, now we have considered the gain of the transmitting (and receiving) antenna and also the transmit power and hence derived the EIRP for the satellite. For Meteosat channel 1 (SDUS) this is 18.2 dBW or 48.2 dBm - worst case. In order to arrive at a specification for the receiver (or converter) we will

need to know how much signal power we can expect to be present at the input to the receiver.

Once the signal has been transmitted it will experience a loss from several factors before arriving at the receive antenna.

The major factor is the free space loss L. This results from the dispersion of the wave energy, due largely to spreading loss (a function of distance) and also loss related to the frequency.

$$L = 20\log(4\pi d^*(10^3)/\lambda)$$
$$= 20\log(70996.44^*d) \qquad \text{EQN 2}$$

where d = slant range (distance between satellite and ground station in metres).
and $\lambda = 0.177$ m

To calculate d we need to know the latitude of the ground station (B). This is obtainable directly from the Ordinance Survey Office (expensive) or quite accurately from a local 1:50 000 OS map, or now GPS!

$d = [(m^2) + (r^2 2) - (2^*m^*r^*\cos B)]$ ½
s = satellite height above equator
= 36000 km
r = radius of earth
= 6400 km
and m = s + r
= 42400 km

simplifying
$d = (1838720000 - (542720000^*\text{CosB}))$½ EQN 3
B = 51.53 degrees (for west Maidenhead)

therefore d = 38744km.

Now we can calculate the path loss
$L = 20\log(70996.44^*38744)$ dB
= 188.8 dB

It is worth noting that due to the relatively small increase in path length L for the south coast of Great Britain is 188.77 dB and for the Orkneys is 188.95 dB. A difference of only 0.18 dB.

There will be some additional attenuation of the signal due to the earth's atmosphere (AL) - worst case 0.7 dB, typical for L band. We will also assume the receiving dish is rotated to align with the received polarization, hence no polarization loss. We must also consider the gain of the receiving antenna (Ga). So now we have a total received power of

EIRP - L - AL + Ga = 48.2 -188.8 -0.7 + Ga
= (-141.3 + Ga) dBm

e.g.
if the antenna diameter = 1.5 m then Ga = 27.0 dBi (e = 70%)
then received RF = -141.3 + 27.0
= -114.3 dBm

if the antenna diameter = 1.0 m then Ga = 23.4 dBi (e = 70%)
then received RF = -117.9 dBm

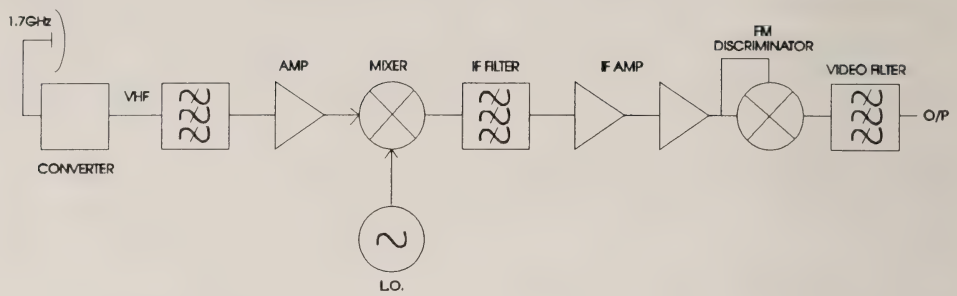
So, what performance can we achieve from our receiver? What diameter dish will we require? How is this effected by the receiver noise figure?

The usual thing at this point is to go through descriptions, analysis and derivations of noise, noise factor, noise figures, noise sources, Boltzmans constant etc. However, as there should be more than one article in each edition of RIG and we want to get to the useful bits, I will make some assumptions as we go along. These should in no way effect the end result just miss out some explanations and derivations.

We need to consider the factors that make up (and limit) the receiver performance and hence be able to choose a suitable antenna or receiver noise figure for our application. In a well designed receiver (at L band) it is the noise received by the antenna plus the noise generated in the first gain stage and all the losses before it that determine the noise occurring in the demodulated output. As the limit of receiver performance is determined by the amount of noise appearing with the signal in the output, i.e. output signal-to-noise ratio (SNR), we need to consider the amount reaching the output.

It is generally accepted that for an ideal noise free picture on Meteosat SDUS channel 1, an SNR at the demodulated video output of 35 dB (or better) is required, and we have said that this figure is dependent on the front end performance. Starting with this information we can work our way from the output of the receiver back towards the input and hence obtain a required performance figure from the front end.

Fig.3



If we examine the process of FM demodulation, we will find that the SNR after the demodulator improves more rapidly than the RF (or IF) SNR at the input to the demodulator. This improvement is a function of the signal bandwidth, the system deviation and the modulating frequency. The improvement is referred to as the DEMODULATION GAIN and occurs after a certain signal threshold has been reached. Note, it is possible in certain specific systems to suffer a signal to noise degradation but not in this case. Having first calculated the demodulator gain, we can then determine the carrier to noise ratio (C/N) figure we require at the demodulator input.
An examination of the Meteosat signal shows the following characteristics:

Deviation	=	+\- 9 kHz
Modulation Subcarrier	=	2.4 kHz
Video frequency	=	0 - 1.6 kHz

therefore highest modulating frequency (Fm)
= 2.4 + 1.6 kHz
= 4 kHz

Modulation Index (B) = max. dev./highest mod. freq.
= 9/4 = 2.25

as this is greater than pi/2 occupied bandwidth (BW)
= 2Fm + 2Fd (Carson's rule)
= (2*4) + (2*9)
= 26 kHz

So back to the demodulator gain
= $3(BW/2Fm)^3$
= $3(26/2*4)^3$
= 103
or 10log103 dB
= 20.13 dB

If post detection SNR = 35 dB
then predetection carrier to noise ratio (C/N) required
= 35 - 20.13
= 14.87 dB.

Noise is a randomly occurring effect occupying all frequencies and so the noise power in a channel is limited only by the bandwidth restriction of the channel. i.e. the wider the bandwidth the greater the noise power filling it. This is why the bandwidth in a receiver should never be greater than that required by the signal characteristics at that point. An allowance should also be made for local oscillator and transmitter frequency inaccuracy. So we consider the noise power as a function of the bandwidth, referred to as noise bandwidth (NB), where

NB = 10logBW EQN 4
= 10log30E3
= 44.77 dB

where BW = 30 kHz (practical)

We have said that noise occurring in the output of a well designed receiver is due to received and generated noise in the front end. Using the information derived thus far we find that the required SNR

= C/N + NB (at input to the IF) EQN 5
= 14.87 + 44.77
= 59.64 dB

So where have we got to? We have evaluated the signal power arriving at the receiving input and shown that it depends on the satellite transmitted power, the propagation path characteristics and the gain and efficiency of the antenna. We have determined the required SNR at the input to the receiver I.F. amplifier. Now we have to calculate the amount of noise power that occurs in the front end i.e. between the antenna and the I.F. amplifier and hence gets mixed in with the signal and so understand how "good" our system needs to be.

We ought to say something more about noise at this point. All resistors (and the front end source impedance contains such a resistance) produce noise at any temperature above 0 degrees Kelvin or -273 Centigrade (absolute temperature). This is due to the random motion of free electrons (Brownian motion).

The amount of noise (or noise power) is a function of the temperature of the source and of the bandwidth to which the noise source is coupled. Note, it is not a function of the noise source resistance. The factor relating the energy produced by a particle in motion referred to 0 degrees K is Boltzman's constant (BC). The value of BC is -228.6 dBW/K/Hz. or -198.6 dBm/K/Hz.

Using the above information we can derive an expression for the required "quality" of the front end. This is referred to as the FIGURE OF MERIT (G/T) and indicates the antenna gain required for a converter (front end) having a particular noise figure or having an already defined antenna gain the maximum noise figure we can tolerate.

So, the required minimum G/T figure is

$$= C/N - EIRP + BC + NB + L + AL \qquad \text{EQN 6}$$
$$= 14.87 - 48.2 + (-198.6) + 44.77 + 188.8 + 0.7$$
$$= 2.34 \text{ dB/K}$$

What gives the system it's G/T figure? It is a function of antenna gain and noise.

The more positive the G/T figure the better the system. A good G/T figure could be achieved by a high gain antenna and poor receiver performance or by a low gain antenna with a high performance receiver or, an excellent G/T figure realized by using the high gain antenna with the high performance receiver.

We have however, said that noise power is directly proportional to temperature above absolute zero and so we can express the front end noise performance in terms of noise temperature.

The noise in our system comes from two main sources.

The first source of noise is external, and is received by the antenna (Ta). This is naturally occurring background noise and is present from both the sky and ground direction. If the antenna has a high angle of elevation sky noise will predominate, if a low angle, ground noise. As may be expected the temperature of deep space is very much lower than ground temperature.

For typical Meteosat elevations (approx. 50 degrees) a figure of 70 degrees K is usually taken. Interestingly, this is independent of antenna gain. We saw that the beamwidth of the antenna narrowed but it's gain increased as the diameter went up. From this we can see that a high gain antenna receives

noise strongly from just one direction whilst a low gain (wide beamwidth) antenna receives less strongly but from a "wider" direction. Hence the noise power received in both cases is just about equal.

Care must be taken that the sun is not in the antenna "window" or large (high temperature) errors will result. The sun has a temperature of 50 000 K! Very low gain antennas i.e. wide beamwidth may see the ground temperature (typically 270 degrees K) so care must also be taken in this case.

The second source of noise is internal and is generated by the receiver itself (Tr). We are used to quoting our amplifier (or preamplifier) noise parameters in dB. We see manufactures quoting device noise in dB or cable losses in dB.

This is the NOISE FIGURE and is a quantity expressed in dB (FdB). However we have been working in degrees K and so need to consider a conversion.

If we have noise plus a signal present at the input to an amplifier which itself produces no noise (FdB = 0dB) then the same signal-to-noise ratio will exist at it's output. We can express this as a ratio (Fn):

$$Fn = SNR \text{ in } / SNR \text{ out} = 1$$

in practice Fn is always > 1. FdB is Fn converted to a logarithmic scale and expressed in dB.

i.e. $FdB = 10\log Fn$ or $Fn = 10^{FdB/10}$ EQN 7

The usual reference temperature for FdB is 290 deg.
(To = 273 + 17 Cent.).

From this we have the conversion of

$$T = 290(Fn - 1). \quad \text{EQN 8}$$

Care must be exercised when considering noise quoted in dB. This is only valid for the ambient condition (17 C.). If the amplifier or noise source temperature is outside this condition, the conversion may become invalid.

Now we have a method of converting noise expressed in dB to noise temperature. So the total noise temperature (Tt)

$$= Ta + Tr$$

Table 2 gives tabular values in a possible area of interest.

TABLE 2

CONVERSION OF FdB TO Td AND Tt WHERE Ta = 70K

FdB	Td	Tt	FdB	Td	Tt	FdB	Td	Tt
0.3	20.74	90.7	1.1	83.59	153.6	1.9	159.16	229.2
0.4	27.98	98.9	1.2	92.29	162.3	2.0	169.62	239.6
0.5	35.39	105.4	1.3	101.20	171.2	2.1	180.32	250.3
0.6	42.96	113.0	1.4	110.31	180.3	2.2	191.28	261.3
0.7	50.72	120.7	1.5	119.64	189.6	2.3	202.49	272.5
0.8	58.66	128.7	1.6	129.18	199.2	2.4	213.96	284.0
0.9	66.78	136.8	1.7	138.94	208.9	2.5	225.70	295.7
1.0	75.09	145.1	1.8	148.93	218.9			

Using the antenna gain, (Ga) and the total noise temperature (Tt), we can now calculate the actual figure of merit for a practical system.

We have calculated the minimum acceptable (G/T) for a system in the defined location is 2.34 dB/K, so we can now tabulate dish diameter (D), (see equation 1) against Tr and F(dB) for an efficiency of 70% for an acceptable performance.

TABLE 3

OPTIONS FOR DISH DIAMETER AND CONVERTER NOISE FIGURE FOR G/T = 2.34

DISH DIA (M)	1.5	1.3	1.2	1.0
Ga AT e=0.7	496	372.5	317.4	220.4
Tt	212	159.2	135.6	94.2
FdB (from eqn8)	1.7	1.1	0.8	0.3

Now I am sure many of us are using, say, 90 cm. dishes with converter noise figures in excess of 2 dB. This would give a G/T (at 70% efficiency) of 220.4/239.6 = 0.92. We have said that a figure of at least 2.34 is necessary, so what is happening?

We know 35 dB SNR (C/N 14.87 dB) produces an ideal display. This figure provides an adequate safety margin under all conditions. In practice most amateurs would consider the display produced by an SNR of 33 dB (C/N 12.87 dB) to be perfectly acceptable. We have also taken a worst case EIRP figure for Meteosat, end of life. In practice we will find the figure to be better than this.

Recalculating the output SNR achieved with a system having a G/T of 0.92 we find

$$C/N = 48.2 + 0.92 + 198.6 - 44.77 - 188.8 - 0.7$$

$$= 13.45$$

This gives an SNR of 13.45 + 20.13 (demodulator gain) = 33.58

This will produce a very acceptable display.

APPLICATION

We will consider a G/T of 0.92 to give a generally acceptable display. We can use Table 4 to select either our dish diameter given a converter noise figure or assess the required converter noise figure if we already have chosen a dish.

The table assumes an antenna efficiency of 70%.

TABLE 4

OPTIONS FOR DISH DIAMETER AND CONVERTER NOISE FIGURE FOR G/T = 0.92

DISH DIA (M)	1.5	1.3	1.2	1.0	0.9	0.8	0.7	0.6
Ga AT e=0.7	496.0	372.5	317.4	220.4	178.6	141.1	108.0	79.4
Tt	539.1	404.9	345.0	239.6	194.1	153.4	117.4	86.3
FdB from TABLE 2	>2.5	>2.5	>2.5	2.0	1.5	1.1	0.6	<0.3

To work outside these figures, it is necessary to decide on an acceptable G/T figure for the particular system.

G can be obtained from Equation 1, after having considered the efficiency. Tt can be determined from Equations 7 and 8 and selecting a value for Ta (typically 70 degrees K).

Dishes and converters can then be chosen appropriate to the requirement. These should be selected to achieve the G/T required for the chosen performance.

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While we will take steps to check master disks of GIF, Shareware and upgrades, RIG and it's officers will not be responsible for any virus damage caused.

SHAREWARE CORNER

LES HAMILTON

NOATIF v 3.0

Since version 2.0 of NOATIF became available in March, Paolo Cerretti has come up with its successor. In addition to converting .DAT, .NOA and .RAW data files into TIF format, the program now handles the .FAX (wefax) and .IMA (PDUS) formats as well. No need to create a configuration file now either - this has all been done for you, on the assumption that all your files are in the C:\VGASAT directory. Otherwise, there remains the option of pressing function key No 8 (f8) to edit them. The program has an altogether slicker feel to it, and now displays data such as filesize as it converts the image. The completed TIFF files can be read into 'Neopaint' and converted into your chosen format such as GIF, PCX. They can also, with a little trial and error judging the length of the file header, be satisfactorily loaded into IMDISP for enhancement, then output in GIF format. Finally, NOATIF3 exits much more elegantly than its predecessor, at the touch of the f2 key.

NOATIF 3 can be found on Disc 99 and the RIG BBS.

STS PLUS

This program was produced for the purpose of tracking the Space Shuttle and other artificial satellites. Needless to say, it also performs superbly with Polar Orbiting Weather Satellites. Unusually, registration of this program is optional - you can pay $10 if you wish, but the author makes no requirement that you must do so! Unlike SATTRACK, whose strengths lie more on the computational side, and in its abilities to churn out reams of statistics, STS PLUS is dedicated much more to the visual side of tracking. For example, you can observe your satellite on a mercator map of the World at normal speed (boring), or in x10 or x60 modes, simply by toggling the f4 key. But the most exciting feature to my mind is the facility to change to orthographic projection, and follow satellites over the Poles. Unlike any other program I have seen, STS PLUS automatically redraws the orthographic World Map every time the satellite footprint intersects the edge of the map, so that you have a continuous, dynamic display. With mercator maps, you have the option to toggle between auto-redraw or not. The program offers so much. You can zoom in to a quadrant of the Earth, set the program to auto mode, and you can again follow a satellite continuously from one quadrant to the next, the map refreshing when the satellite footprint intersects its edge. You can select Tracking Maps, centred on a selected tracking station from the large database provided, or you may set a location map, the location being any specific tracking station from which you wish to view (you would ideally set this to your own latitude/longitude). The program allows the user to edit the

datafiles that come with it. The program accesses its satellite data from files in NASA 2-line element format. This means that a file of 2-line elements created with your Prosat II software can be copied directly into the STS Plus directory, and made the default satellite file! The .DOC file with STS PLUS stretches to 383k (about 130 pages), so you will appreciate that I have merely touched upon its possibilities. Nevertheless, it really is worth having a look at, and it can be run under windows if desired (it has its own icon). It is a program that should give hours of entertainment. The program is provided as a self-extracting file of about 450k, called STS930.EXE. Create a directory STS on your hard disc, place STS930.EXE inside it. Now double-click on STS930.EXE, to expand the files. This complete, delete STS930.EXE, and run the program by double-clicking on STSPLUS.EXE.
STSPLUS can be found on Disk 99D.

GIF-REED
A new viewing program, and probably the first to really give that old favourite VPIC a real run for its money. In fact, once you realise its full capabilities, it simply leaves VPIC standing! The program can, optionally, be run either from DOS, or under Windows. GIF-REED combines the functions of three programs. It provides a viewing environment very similar to VPIC, it allows pixel editing after the style of IMPROCESS (though much better), and it can create screens with multiple "thumb nail" images of GIF files, like GIF DESK. Using GIF-REED as a GIF viewer could hardly be simpler. Drive and directory selection are done with the mouse, and loading the selected GIF image is very rapid indeed. The similarities with VPIC include the use of the function keys: f5/6 increment/decrements screen resolution, f7 provides resolution locking, while a slideshow facility is provided with f10. Once the image is on-screen, Ctrl f1/2 increases/decreases red intensity and so on, just like VPIC, with Alt-f10 restoring the original. Pressing "W" while an image is on-screen allows you to save the image file, in either .GIF, .BMP, .PIC or .PCX format. The picture editing feature is invoked by pressing "E" during image display, and creates a display with the colour palette at the top of the screen, and a quarter-size viewing window and a pixel editing window below it. Clicking the mouse on the viewing window reveals a 26x26 pixel square outline, whose contents, greatly enlarged, appear in the pixel editing window. Individual pixels can be altered by selecting colours from the palette, or by placing the mouse pointer over an adjacent pixel, and pressing "F". Clicking with the mouse now changes an adjacent errant pixel to this colour. In addition to pixel editing, there are facilities to flip, invert, make a mirror image, rotate, add text, change screen resolution, and resize the image. You can even make sliding-block puzzles from your favourite image, and in a range of difficulty levels! However, be warned, a number of the editing facilities are disabled in the shareware version - you have to register the Pro GIF-REED at a cost of $49.95 for these. It should be stated that the pixel editor does work in the shareware version - it simply does not allow you to save your edited image! Despite having to send to the USA, I received my copy

within three weeks, and payment is conveniently available by credit card. Even if you choose to stick with the shareware version, you still have a superb GIF viewer. The catalogue feature is invoked by pressing Ctrl-C from the opening files list menu screen. You can chose the resolution, and how many rows of images (maximum 10). The creation of a catalogue does take time, however - take the dog for a walk while it is in progress. Once the catalogue is complete, you are prompted for a filename, and the screen is saved to disc as a GIF file. This looks the best way yet of compiling an easy-to-use catalogue of your GIF images. GIF-REED, which comes as the file GIFV412.EXE, is well worth investigation. Of course, it has the nowadays obligatory "nuisance" start-up screens, but these are removed in the registered version. Also included is a 250k documentation file (100 pages). *GIF-REED can be found on Disc 99D.*

AOS

This is a BASIC program that calculate, and prints out, the four to six most favourable passes of polar orbiting weather satellites for one day. It was originally offered as Satprog (RIG, June 1991), but has been considerably upgraded since, now including an easy-to-use kepler editor. There are two versions of the program, AOS230.EXE (the GWBASIC version) and AOS250.EXE (the QBASIC version). In each case, the program is supplied as a self-extracting file - just double-click on it to expand.
AOS can be found on Disc 99D.

RIGHTIME

How often have you cursed the inaccuracy of your PC's so-called "real-time" clock ? Well, at last here is a handy utility that claims to give accuracy to better than half a second per week. RighTime v 2.5 occupies just 6.5 K of system RAM, and can conveniently be loaded high. RighTime is supplied as the self-extracting file RT253.EXE. To install, create the directory RT2 on drive C, copy RT253.EXE into it, and double click on it. Once the files have been expanded, delete RT253.EXE, and double-click on SETUPRT2.COM to install the utility. RighTime works on the principal that, however inaccurate your RT clock, it will be unvaryingly fast or slow. To get RighTime working efficiently, you have to regularly, over several days, input the accurate time of day by means of the DOS TIME command. You can take the time from your accurate quartz watch, or the Telecom Speaking Clock etc. Whichever method you choose, it is vital that the times are accurate, as the program uses them to determine the necessary corrections to the RT Clock. Each time the time is entered, the accuracy of the corrections increases. After a few days, RighTime should keep the computer's clock accurate within 0.5 second per week. Points to note are that the time must be set accurately at least once a month to maintain the accuracy of RighTime. Also, it is recommended that the computer should not be switched off for more than a week at a time since more than a week's activity will result in loss of accuracy. RighTime has a registration fee of $40.00. *It can be found on Disc 99D.*

RIG SHAREWARE LIBRARY... Viewing/tracking progs. etc. *PC Only!*

Disk 99	VPIC v.6.0 (viewing program, GIF, RIX, PCX, etc.) IMAGE PROCESS v.1.0 (GIF editing program) PCTRACK v.1.1 (Satellite tracking program, simple to use) GRAPHICS WORKSHOP v.6.1 (viewing/conv. for GIF, etc.) NOATIF v.3.0 (converts .DAT .NOA and Raw data files to .TIF) TRAK275 (satellite tracking program) DAT2PA2 (DAT to PA2 conversion program)
Disk 99A	PCT241 (latest version of PCTRACK with 2-line keplers) EDSAT v.1.6 (program for manipulating NASA 2-line files) ELEMENT MANAGER v.1.8 (management for 2-line and Amsat) VGA CAPTURE v.8.0 (resident screen capture program) COMPUSHOW v.8.41A (self-sizing viewing program) CUT-NOAA (a trimming program for large .NOA files) GIFDESK v.4 (a GIF viewing program) DOWN (Autodown & Prodown for ProsatII control)
Disk 99B	WINGIF (viewing program for GIF via Windows3 & 3.1) PAINTSHOP (another viewing program - Windows3 & 3.1) GEOCLOCK (Graphical map showing daylight areas, etc.) LEARNORBIT (Teaching program about orbits) WX v4.3 (Weather forecasting program) GIFDOT2 (GIF printer routine for dot matrix printers) JVFAX v5.1 (APT, FAX, WXFAX, etc. receiving program)
Disk 99C	NEOPAINT (GIF, TIFF, PCX Editor + Paintbox program) GWSWIN11 (Windows version of the viewing/edit program)
Disk 99D	IMDISPLAY v.7.9 (GIF, etc. viewing/enhancing program) STSPLUS (Satellite tracking program) GIF-REED (GIF, etc. viewing/enhancing program) AOS (Basic prog. for predicting best sat. passes each day) JOINPIX (Joins ProsatII CO2 and CO3 images together) RIGHTIME (Keeps your CMOS clock right on time for gridding, etc.)

You will need a viewing program to see the GIF files; VPIC is recommended for starters. It is supplied on Disk 99 in zipped form. PKUNZIP is included on all the Shareware disks. To use zipped versions of any of the programs... make a directory or subdirectory on your hard disk, where you want the program to reside (i.e. C:\VPIC) and unzip it into the directory as follows: **PKUNZIP <filename.zip> <Hard drive letter:\directory or subdirectory> (i.e. PKUNZIP VPIC50 C:\VPIC).**
Next read the Doc and Readme files to enable you to configure it to suit your video card and machine. Remember that some of the images may lack contrast and brightness. As most of the files supplied are in their original form, 256 levels, you will probably have to use the contrast and brightness keys on your viewing program to set the levels to your own preference. This can make a world of difference to the finished picture. Remember that if you resave the GIF file after altering the brightness and/or contrast you will always loose some of the original data. This is our main reason for supplying most of them in their original form. F3 is useful for finding file size.

HOW TO GET YOUR COPIES OF THE RIG SHAREWARE LIBRARY...
Disks 99 -99D only

All requirements as for the GIF Picture Library (please read carefully!), but send your requests to Les Hamilton at the address below. **Note... 1.4Mb 3.5" Disks only! Please send all new and updated versions of Shareware, etc. direct to Les.** All enquiries regarding Shareware to Les (Letters only!); answered by return.

THE ARCHIMEDES PICTURE LIBRARY

All the Picture Disks 1 to 34 are available for the Archimedes.
The Shareware Disks 99 to 99D are for PC users only!

How to obtain Archimedes Images...
The "Rules" for Archimedes owners are identical with those for PC owners. The only difference is the address to which to send requests, which is:-

LES HAMILTON, 8 DEESIDE PLACE, ABERDEEN, AB1 7PW

Please send only 800kb 'E' formatted DS/DD discs. Les uses an old Archimedes 310, and cannot handle the high format 1.6Mb discs used by the more modern machines. (All machines can format to 800kb on DS/DD discs) **Note Library disks Nos. 26, 27 and 30 will require two 800kb disks each to get all the converted files on.**

If you have any !Framestore discs which you have created, please feel free to send a copy, to Les Hamilton for evaluation.

FOR SALE...

Professional 6ft diameter 6-section petal dish, complete with robust mount, with elevation and azimuth adjustments. As used by news agencies, etc. Transportable in estate car.
£75.00, Buyer Collects.

Further details from Maurice Wigg, Tel: 0202 760086.

THE SOVIET & CHINESE SCENE

PETER WAKELIN

METEOR 3-3 has been operating continuously since early March and has provided some excellent imagery of the seasonal ice break-up off the coast of northern Europe. There was very little ice in the Gulf of Bothnia this year and even that to the east of Spitzbergen disappeared very rapidly, indicating that it was much thinner than in most winters recently.

METEOR 3-3's ground track across Europe remains well illuminated until mid September. By then, with the approach of winter, land/sea temperature differences at night will be increasing so the southbound, evening, IR passes should be interesting.

METEOR 3-4 came on in May as expected but has run into problems which, at the time of writing in mid July, have not been resolved. Visible images have been fairly good, but I have not seen any IR pictures.

Recently, the visible sensor has switched off long before the satellite reached the unlit side of the Earth. This showed in the binary edge-code which behaved normally until reaching a decimal value of 48 then instead of the iris continuing to open and the code changing to 49, it closed to its minimum size, with a value of 10. This value is normally associated with very high sun intensity so it was hardly surprising to see the image turn almost black for a time before switching off.

Following the demise of the Total Ozone Mapping Spectrometer on METEOR 3-5, it is possible that we will see images from this satellite again. Mark Kessel, of Stoke-on-Trent, gave me a frequency for TOMS, 466.5 MHz, which he found on a packet radio bulletin. I would be pleased to hear from anyone who heard signals on this frequency.

I have also heard a report of an imminent launch of "TEMISAT / METEOR-2". Geoff Perry told me that TEMISAT (TElespazio MIcro SATellite) is a small communications satellite built for the Italian satellite communications service provider by Kayser- Threde GmbH in Germany. It remains to be seen if it is launched with a METEOR but I think another series 2 METEOR is unlikely.

Several members have asked me why land detail is poor on METEOR visible images compared with that of NOAA ones. Very briefly, this is what happens. The visible light sensors detect reflected sunlight from the Earth's surface and the amount of light reflected depends on how much is absorbed by the surface. Different coloured surfaces absorb light of different wavelengths, so the reflected light will also vary in wavelength.

The brightness of the reflected light as seen by the satellite therefore depends on the spread of wavelengths its sensors can detect, ie its bandwidth. The METEOR sensors cannot detect the red end of the spectrum well whereas the channel 2 sensor on the NOAA craft is much more sensitive to red light.

One of the main uses of METEOR imagery is the monitoring of ice in the Arctic Ocean and ice/water boundaries are particularly contrasty. Dry, sandy soils are prominent too but damp soils and vegetation appear much brighter to the NOAA channel 2 sensor. The NOAA channel 1 sensor has similar characteristics to the Russian one and there may be an opportunity to do a side-by-side comparison soon.

APT users rarely get to see channel 1 but after NOAA 13 is launched, and if past procedures are followed, it is likely that for the first week or so there will be no IR images.

Instead, two visible images may be transmitted, from channels 1 and 2. The channel identification appears at the edge of the image as the bar adjacent to the black end of the 8 stepped grey bars. Match its colour with one of the grey bars (black = 1, white = 8) to ascertain the channel number.

Once again, I have nothing to report on the Chinese scene.

FOR SALE...

Timestep B&W Compact framestore 3 years old £150
Phillips B&W Monitor 12" High Resolution Picture tube £50

Ring Brian (G0HKR) on 0252 624358 (Fleet, Hants)

KEPLER ELEMENTS

SIMON GOODALL

```
NOAA9
1 15427U          93203.61178270 0.00000099                        4191
2 15427  99.0984 244.4018 0016068  69.2119 291.0768 14.13533173    17
NOAA10
1 16969U          93203.60313311 0.00000126                        2626
2 16969  98.5163 217.5657 0012353 209.1588 150.8897 14.24822967    19
NOAA11
1 19531U          93204.14367337 0.00000106                        1707
2 19531  99.1338 180.6530 0011977 343.0478  17.0260 14.12898523    11
NOAA12
1 21263U          93204.04579165 0.00000198                        6273
2 21263  98.6554 233.4809 0013919 107.7971 252.4736 14.22289791    12
MET3-2
1 19336U          93194.02258664 0.00000043                         470
2 19336  82.5404 203.6663 0018698  29.0963 331.1196 13.16959778    15
MET3-3
1 20305U          93204.00035551 0.00000043                        7226
2 20305  82.5532 139.6110 0017244  29.6502 330.5594 13.16022231    11
MET3-4
1 21232U          93201.55182390 0.00000043                        3717
2 21232  82.5400  44.1390 0017838 313.1818  46.7812 13.16823044    15
MET3-5
1 21655U          93203.68290353 0.00000043                        4419
2 21655  82.5514 349.4389 0013548 307.1873  52.8011 13.16822717    12
MET2-17
1 18820U          93200.27227550 0.00000024                        8750
2 18820  82.5421 173.3941 0018665  38.2724 321.9757 13.84688369    14
MET2-18
1 19851U          93203.06277606 0.00000053                        8136
2 19851  82.5177  47.1178 0015955  73.4229 286.8683 13.84340304    18
MET2-19
1 20670U          93194.86381434 0.00000051                        5651
2 20670  82.5475 117.2064 0017332  21.4305 338.7556 13.84178382    13
MET2-20
1 20826U          93194.64633721 0.00000071                        5695
2 20826  82.5253  55.3406 0012108 282.2356  77.7447 13.83554704    15
FY1-2
1 20788U          91336.60222287 0.00000000                        2829
2 20788  98.9161   6.4973 0015529  88.3536 271.9405 14.01172198    18
```

(No excuses for listing all the Mets as we cannot tell which will be on!) The frequencies shown are the last frequencies the Russian satellites were heard on. NOAAs do not change frequency.

An explanation of the 2-line format for those who wish to convert or update their Amsat format files... In order, the blocks of data represent the following...

Line 1 : NORAD sat.number - Epoch date - Decay Rate - Checksum

Line 2 : NORAD sat.number - Inclination - Right Ascension - Eccentricity - Arg.of Perigee - Mean Anomaly - Mean Motion (8 decimal places) - Revolution No. - Checksum (1 digit)

(Note: The Eccentricity has a leading decimal place which is not shown but assumed.)

MEMBERS' LETTERS

[Any letters sent to the Editor, Make-up Editor or Committee are assumed to be available for publishing in the Newsletter, unless otherwise specified.]

Dear James,

What a wonderful day it was for the Rally at Longleat Safari Park last Sunday. And what a tremendous disappointment it was to visit the RIG stand. As a newcomer to Remote Imaging I was having difficulties with several aspects of the programme I had purchased which had very sparse instructions (PROsatll) and I had been saving my queries up for the rally where I had hoped to get them sorted out. No luck I'm afraid. I felt that I was being talked down to and that my questions were far too inconsequential to warrant a serious reply.

Luckily, getting rather long in the tooth, and being involved in Amateur Radio for many years I was able to meet many of my Amateur friends who were able to put me on the right track, and advise me where I had been going wrong, that's what rallies were all about, or am I going back too far in time?

I am aware of the time expended by volunteer members of an organisation, I have filled most of the posts of my own Radio club, including 8 years Editor/printer/publisher of our magazine but I do feel someone should be available to advise members with queries and problems and not be solely interested in signing further members and selling equipment.

I purchased my receiver from Dartcom, and being in their area I was able to collect it myself. Their approach was extremely helpful, any queries I had, I was to give them a call and if necessary take the receiver back and they would sort things out, although their instruction booklet was comprehensive and I experienced no problems. A first class firm I thought. Everyone becomes interested in new projects at different times during a lifetime and a little help in the early stages is most welcome.

Yours sincerely,
Geoff Cooper (G3VJB) The Firs, Treskerby, Redruth, Cornwall TR16 5AG

[Geoff has spoken to Henry since, and his system is now performing satisfactorily]

PROSPERO

Anyone picking up a weak signal on 137.56 MHz with a continuous hum for modulation has probably found the british scientific satellite originally designated X3 and later, Prospero.

The satellite was built for the M.O.D. by B.A.C. and Marconi S.D.S. in 1971 and was unique in British Space history as being the only payload put into orbit by an all British designed and manufactured rocket launcher, Black Arrow. This three stage mainly liquid fuelled rocket was built at Cowes on the Isle of Wight and test fired (not launched!) with the satellite on board at a site near the Needles at Alum Bay. It was then shipped to Woomera in South Australia and launched into a near polar orbit on October 28th 1971. Unfortunately, despite the successful launch, the Black Arrow project was cancelled the same year. The experiments carried on Prospero were designed to investigate the performance of a new type of silicon solar cell and the functioning of thermal control panels under orbital conditions. Data from these along with micrometeorite flux measurements and routine 'housekeeping' parameters are multiplexed on each telemetry frame.

The 137.56 MHz carrier is phase modulated by the telemetry signal, which occupies a bandwidth of about 8 kHz. The maximum transmitter power is 300 milliwatts which is subject to losses in the circularly polarised antennae system. This accounts for the poor signal when received by a simple crossed dipole.

When the satellite had completed it's design life, the transmitter was switched off and only commanded on for a few days around the launch date anniversary on subsequent years, just to see what was still functioning. The latest information (Nov. 1991) was that the satellite was tumbling out of attitude control, (it was originally spin stabilised) that the Nicad batteries had failed but that the telemetry was still operational when the solar panels were in full sunlight.

Re-entry is not predicted for several decades, so we may occasionally hear the characteristic hum for some time to come. It would be interesting if someone could provide a set of kepler parameters.

Tony Hall

(Tony Hall can be contacted via A. F. Bareham, C Eng., MIEE, Pond Close Cottage, Warlands Lane, Shalfleet, Newport I.O.W. PO30 4NG Tel: 0983 78481)

Dear James,

I was fascinated to read Frank Bell's article about the use of IMDISP on page 80-1 of RIG 33. Being able to splice together two Meteosat images perfectly is a great idea. However, his method combines the entire eastern CO3 image with just a narrow strip of the Atlantic CO2 image.

Since, in general terms, the Atlantic weather is more relevant to us in Britain than the weather over eastern Europe, I have done a little tinkering about to make the method more versatile and user-friendly.

It is possible to create batch files to carry out sequences of IMDISP commands automatically, and I have prepared two such batch files called "EAST" and "WEST".

The file below, which I have named "EAST", splices the full eastern image (CO3) on to the eastern portion of the western image (CO2), so that the complete U.K. is near the left hand side of the composite image.

```
IMDISP=VESA
FILE CO3.DAT
DIS SS 24
ERASE
DIS DOWN 40
SAVE TEMP.DAT
FILE CO2.DAT
DIS SS 250
ERASE
DIS DOWN 40
FILE TEMP.DAT
DIS DSS 344
SAVE ESPLICE.DAT NL 720 NS 1020
```

This file must be placed within the IMDISP directory. There must, of course, also be files named CO2.DAT and CO3.DAT within the IMDISP directory.

Now, when running IMDISP, simply enter BATCH EAST at the opening prompt. The only user input required is to enter the numbers 800/640/8/0 when prompted to do so for each of the two images.

The entire image-forming process proceeds automatically, and the merged file is titled ESPLICE.DAT. Should you wish to save this file in GIF format - easy.

Just edit the last line of the above file to read SAVE ESPLICE.GIF NL 720 NS 1020, and it will be done for you. Yes ! It's as easy as that.

To prepare a composite image consisting of the entire Atlantic CO2 frame, with Britain at the right hand side of the composite image, the following file, called "WEST" does the trick. It merges the entire western image with just a narrow strip of the eastern one. The spliced file is saved as WSPLICE.DAT.

```
IMDISP=VESA
FILE CO3.DAT
DIS SS 24
ERASE
DIS DOWN 40
SAVE TEMP.DAT NS 400
FILE CO2.DAT
DIS SS 24
ERASE
DIS DOWN 40
FILE TEMP.DAT
DIS DSS 570
SAVE WSPLICE.DAT NL 720 NS 1020
```

Once you have created ESPLICE.DAT or WSPLICE.DAT, you should rename the files. If you don't, then they will be overwritten next time you merge CO2 and CO3 images.

Fairly obviously, of course, once you have merged two images, you must delete the CO2.DAT and CO3.DAT files from the IMDISP directory, and replace them with new CO2.DAT and CO3.DAT files for your next merge.

Finally, it will be noted that I have replaced the IMDISP=VGA opening command with IMDISP=VESA, which you should certainly do if you have a VESA compatible graphics card. This gives 1024 x 768 resolution, whereas the IMDISP=VGA setting only gives 640 x 480.

I hope this will make life easier for RIG members keen to produce Meteosat images showing the entire UK.

Yours sincerely,

Les Hamilton, 8 Deeside Place, Aberdeen AB1 7PW, Scotland

Dear James,

It was kind of Bert Ramsden to refer to my column 'Info in Orbit' in RIG edition 33. Perhaps I could add one or two points?

Many years ago I worked at the historically famous Radio and Space Research station in Slough, with colleagues whose names became world renowned in their fields. The lab was then moved to Rutherford, and the complex renamed Rutherford Appleton Laboratories. I was a part of the team operating the UK5, UK6 then IRAS satellites.

After returning to Plymouth in the mid-eighties I re-entered satellite operations as an amateur, joined RIG and contributed monthly to Short Wave Magazine's 'Info in Orbit' column, which was then written by Pat Gowen G3IOR. I was kindly invited to write the column, as from around 1989.

It quickly became apparent that there was little comprehensive published material on the specific topic of weather satellites, and by then, I had assembled a long list of all the things you need to avoid doing!

Short Wave Mag editorial staff invited me to submit the tome for consideration. It was put into the system in 1991. I updated some sections later that year.

Whatever happened to the work after that I have no idea. To summarise the situation - I have no information at all! Letters to SWM remain unanswered.

Meanwhile, I continue to receive considerable correspondence for the column, many letters and pictures coming from foreign shores. It seems to have a fairly high readership and I receive some very appreciative letters.

Some people starting out simply send me a letter (no s.a.e.) and ask for everything that took me years to find out. Fortunately most writers seek brief information which I give freely. The larger percentage of my correspondents request Kepler elements, which I provide for the cost of a stamp.

A number of 'Info in Orbit' folk are more like friends, and long may it remain so.

Yours sincerely,

Lawrence Harris, 5 Burnham Park Rd., Peverell, Plymouth. PL3 5QB

Dear Mike,

I was very interested to read the article by Frank Bell about using IMDISP to manipulate Meteosat images. I gave it a try and have joined all kinds of different images (even a whole Earth disk from CxD - almost!). By chance I discovered that if you subsample COx images by two, all the coastline dots vanish - totally!. The result of joining a subsampled C02 and C03 image is pretty good, as no median filter has been applied, and the image is thus sharper. I guess the reason for the coastlines disappearing is that they are only on the odd numbered pixels. Not as good as a PDUS image, but with the new prices of that system, it will be a long time before I shall be buying one.

I have also managed to add text headers to .DAT files so that IMDISP can read the files directly (simply use EDIT to copy a header from an image saved in IMDISP, and then add it to a .DAT file).

P.S. Neopaint is terrific; I have just purchased the full program.

Geoff Shipton, Chapel Cottage, Moor Lane, Scotby, Lincoln, LN3 5LR.

Dear Mike,

I am a RIG member and teach computing at the HNYOI young offenders institute.

We have just installed my WX SAT system at the prison as a summer recess exercise. The aerial is now installed on a long pole on the roof, clear all round. The first good picture from NOAA11 showed the SUEZ canal!. Now that really did cause some interest; the first time I've seen it that good.

We have 12 computer systems here, all 386s and a 486. We also have my captive audience of eager learners!

Ted Avery, G3WBB, Litchfield, Staffs.

BULLETIN BOARDS:

There are now operating, 24 hours a day, three Bulletin Boards that you can use to download Keplers and get other information regarding latest developments in the Weather Sat scene; such as which Russian satellites are currently operating, etc. The RIG BBS also has Shareware, etc. which can be downloaded. You can also leave messages on both the RIG BBS and the Timestep BBS for the operators. There is no charge for these services, just the cost of your telephone call. The Keplers files on the RIG an Timestep BBSs are updated every week and are in Amsat and 2-line format; or give the Dartcom BBS a try.

The RIG BBS is on 0945 85666.

The Timestep BBS is on 0440 820002.

The Dartcom BBS is on 0822 88249.

The protocol is the normal standard, 8 bit, no parity, 1 stop bit.

A quarterly publication for hardware, software and applications of WEFAX, APT, VAS, HRPT and GOESTAP.

WeatherSat Ink

The Environmental
Satellite Applications Journal

4821 Jessie Drive, Apex, NC 27502, USA

$15 US per year $20 all others, US funds
MasterCard/Visa OK with $1 surcharge

RIG AT RALLIES

For those members who are not Radio Amateurs, a brief explanation of the term "Rally". These are events normally organised by local Radio Amateur clubs and societies, and are held in Schools, Halls, or just outside town in Marquees in local fields. There is normally parking space provided and a small entrance fee is normally charged.

They consist of trestle tables containing new and used equipment and components, from traders in the electronics and computer field, often at knock down prices. (Many resemble the familiar Car Boot Sale.)

There are also displays and demonstrations by radio related societies and organisations (such as RIG). They normally start at 10.00 or 10.30am and fizzle out at around 4.00pm. They are normally signposted from the town in question by small signs attached to road signs, etc. reading "Radio Rally", "Rally", or the initials of the society, such as "ERAS", etc.

If all else fails, look for a stream of cars sprouting aerials on their roofs, and follow them.

IMPORTANT... If you visit a Rally in order to purchase RIG goods please give Henry a ring a couple of days before, so that he can put them on one side for you, as only small quantities are normally taken.

We hope to attend the following again this year...

September 12	Lincoln, Showground
September 12	BARTG, Sandown Racecourse, Esher, Surrey
September 19	Peterborough, East of England Showground
October 29/30	Leicester, in the Granby Halls (2 days)

We are always pleased to see volunteer members at these rallies, especially those who live local to the event, who can help out on the RIG stand for a short while, and give the regulars a break during the day.

RIG HELPLINES

General Enquiries Meteosat information NOAA information Supplier Complaints A copy of the Group Rules can also be obtained from John Tellick	John Tellick	081 390 3315
Russian, Chinese satellite information/status	Peter Wakelin	0344 23200
Schools Education Co-ordinator	John Tellick	081 390 3315
Schools/	John Murray	Torquay 0803 217754
Educational Enquiries	Frank Bell	Godalming 0483 416897
	Tom Walter	Reading 0734 871330
	Bob Coombes	Haslemere 0428 642930
	John Din	Bristol 0454 773387
	Alan Wright	Norwich 0603 713449
Framestore Technical Support	Mike Coombs (7.30pm-9.30pm)	0530 243494

RIG MICRO SPECIALISTS:

PC and Printer Problems	Mark Pepper (office hours)	0494 471111 (Ext.2133)
BBC Micro	Enquire via John Tellick	081 390 3315
Commodore Amiga	Chris Pretty	0420 82752
Archimedes	Tom Walter	0734 871330
HRPT	Peter Wakelin	0344 23200
PDUS	James Brown (Not available on Sundays)	0656 782632

NOTE: We are very grateful to the above members for offering their services to the Helpline. Please do not abuse the service by ringing them for queries other than those listed against their names.

REMOTE IMAGING GROUP

RIG SUBSCRIPTION - NEW MEMBER

If you would like to become a member and receive the Journal, photocopy this page, complete the form below, sign the declaration and send it to...

RIG SUB, PO BOX 142, Rickmansworth, Herts, WD3 4RQ, ENGLAND

The subscription rates for 1993 are...

UK membership	£ 9.00
Europe EC	£10.00
Europe outside EC	£12.00
Outside Europe	£12.00

Name ..... Call Sign (if any) .....

Address .....

.....

..... Post Code .....

Country ..... Telephone No. .....

Are you receiving:
Polar Orbiting Weather Satellites ..... Geostationary Weather Satellites .....

Do you require Back issues? (see Rig Shop Corner) .....

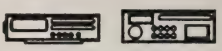
Amount Enclosed £.....

Are you willing to have your name/address made known to members in your area? YES / NO. *(Delete as applicable)*

DECLARATION: I do NOT object to the Remote Imaging Group holding my Membership details on a computer.

Signed ..... Date .....

RIG SHOP CORNER



*** ALL PRODUCTS FOR SALE TO RIG MEMBERS ONLY ***
*** FOR THEIR OWN PERSONAL USE ***
*** NOT FOR SELLING-ON ***

All prices shown include post and packing except where marked

Receiving Equipment	UK/EC Price	Overseas Price
RIG DARTCOM Meteosat Downconverter. Assembled and tested module in tin plate box	£148.00	£126.00
Complete, assembled and mounted in weather-proof box.	£185.00	£158.00
RIG DARTCOM VHF Scanning Receiver. Assembled and tested module, with LED channel number display.	£130.00	£110.00
As above, but with LCD frequency read-out instead of LED channel number display. *Both the above items are modules and require a box, together with several components, switches, etc.*	£171.00	£145.00
RIG TIMESTEP PROscan Receiver. *See advert on page 46.*	£191.00	£163.00 *Special Rally Price £185.00*
RIG VHF Preamp. Includes a bandpass filter and is ideal for mast-head mounting. Assembled/tested module; needs boxing.	£17.00	£15.00
RIG TIMESTEP VHF Preamp Built and tested, in diecast box, 12vdc coax-fed	£24.00	£20.00
RIG 1695MHz Low Noise Amplifier kit. *Experienced constructors only.*	£29.00	£25.00
Computer Software/Hardware		
RIG MICROWAVE MODULES PCwSAT III, IBM/PC Compatible System. *Only while stocks last.*	£ 54.00	£ 45.00 *Special Rally Price £ 49.95*
RIG TIMESTEP PROsat II, IBM/PC Compatible System. *See main advertisement.*	£100.00	£90.00 *Special Rally Price £98.00*
Antenna systems		
RIG CROSSED DIPOLES A Turnstile type design, in kit form *(available in UK only)* incl. P&P		£26.00 *Special Rally Price £20.00*

DISHES *(Available in UK only - Prices do NOT include P&P, see below)*
1.0 Metre (dish only), nearly new condition £25.00
Dish Feeds - Enquire availability from the Chairman.
The above dish prices are for collection from the Chairman, or by prior arrangement at Rallies or Exhibitions.

RIG Binders
Available by post from Gordon Fleming, 168 Bythway, Welwyn Garden City, Herts. AL8 1DU. UK Price £4.00 each, EC/European Price £4.50, Outside Europe Price £5.00. Cheques to *"REMOTE IMAGING GROUP"* please.

Back Issues of RIG Newsletters

		Rally Price	UK Price	EC/Europe Price	Outside Europe Price
RIG 8-11	1987	£4.00	£5.00	£6.00	£7.00
RIG 12-15	1988	£4.00	£5.00	£6.00	£7.00
RIG 16-19	1989	£4.00	£5.00	£6.00	£7.00
RIG 20-23	1990	£5.00	£6.00	£7.00	£8.00
RIG 24-27	1991	£5.00	£6.00	£7.00	£8.00
RIG 28-31	1992	£5.00	£6.00	£7.00	£8.00

Note: Prices quoted are for a set of four, including Post and Packing.
RIG 1-7 are currently out of print.
Individual issues are no longer available (hardship cases excepted).

Ordering Information

All items are available from the Chairman, Henry Neale (except where marked) and include return by UK 1st class mail (except dishes and Newsletters). Euro overseas sent via Airmail printed paper rate.

UK VAT is now applicable on sales to the following EC countries - France, Germany, Belgium, Portugal, Spain, Republic of Ireland, Denmark, Italy, Luxembourg, Netherlands, United Kingdom (including Isle of Man). Members in these countries should use UK/EC price when ordering. EC members who are registered for VAT must forward their VAT registration No. to the Treasurer to enable them to receive VAT exempt goods.

As UK/EC prices now include VAT where applicable; receipts will be issued upon request. Remote Imaging Group VAT Registration No. 594 7483 83.
Channel Isles: divide by 1.175 to remove VAT content.

UK members, By Cheque or Postal Order. **Overseas members,** Pay by Bank Draft (drawn on a UK London-based bank) or Eurocheque(s). (Payments to a Maximum of £100.00 in any one Eurocheque). No local currency please.
All cheques made payable to *"REMOTE IMAGING GROUP".*

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RIG - TIMESTEP PROSAT II

New Features

There have been some significant upgrades to PROsat II for 1993. A new set of discs and a new manual is available from Henry for £15.00. Members who purchased up to 28 days before the changes are eligible for a free upgrade, call Henry for details. The upgrade reflects the needs and suggestions of RIG members.

New purchasers will be pleased with a price reduction to £98.00. Remember the package already includes latitude and longitude gridding on NOAA and now Meteor, direct temperature calibration on NOAA, 100 frame stand alone animation, full satellite data capture and save regardless of video card type.

.BMP Windows export... This will export any screen, in any zoom, in any contrast stretch and or colour in to a .BMP file which is the default for all Windows applications. The Paintbrush program will print in 256 colour and add annotation, even though it won't colour edit in 256 colour mode. All the Windows supported printers can be accessed from Paintbrush.

NOAA Schedule... This allows you to pre-set reception of up to 20 different polar orbiting satellite passes.

Meteor Gridding... The impossible at last ! We can't guarantee this, but our tests indicate that we have cracked the problem of latitude and longitude gridding of Meteor images.

LaserJet 4 600DPI... There is a new driver that allows 32 greyscale printing of images using the new HP LaserJet 4 printer.

Dot Matrix printers... Both 9 and 24 pin dot matrix printers are now fully supported.

Auto Colour... For visible light images from Meteosat, we now have a really clever auto colour function. Just click on the button and false colour will be calculated and applied. Has to be seen to be believed !

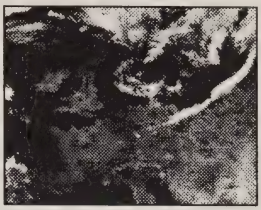
Instant Contrast... Markers can be put on the colour/contrast scale by double clicking the mouse. They can be dragged up and down the scale using the mouse, giving instant contrast adjustment.

Annotation... Both the NOAA and Geostationary programs now have built in annotation facilities. This allows marking of features such as cities and weather phenomena. It is switchable on or off and does not change size as zoom ratios are used.

TH2 IMAGING

34 PRINCES GARDENS
MARGATE
KENT CT9 3AR

Tel : 0843 - 223831
Tel : 0843 - 596256



TH2SAT PC Weather Satellite Decoder Version 2.0 - £100 + £5 P&P

TH2SAT is a software and hardware package that will allow the display of APT signals on an IBM Personal Computer (or compatible). The PC half card contains a single phono input socket, decodes APT signals to 256 levels (using an 8-bit A/D converter) and samples at 4800Hz. In 1024x768 pixel video mode, each pixel is a discrete sampled value, i.e. no scaling up from a lower resolution - ideal for zooming. The input signal level is controlled directly from the keyboard (no knobs to set up or adjust). TH2SAT supports VGA or Super VGA graphics (most Super VGA colour cards are supported - TH2 Imaging strongly recommend Super VGA). Now includes **Colour animation!**

- 3 Video modes supported 320x200 640x480 1024x768 - all modes 256 colours
- Synchronises to METEOSAT (including start tone), NOAA and METEOR
- Aspect ratio correction selected from keyboard
- Zoom images to any level of magnification
- Colour images with dynamic range control and multiple palettes with specific infra-red palettes
- Built-in signal level controller from keyboard - no hardware set up
- Independent signal level control for each satellite mode, e.g. infra red and visible light
- Built-in software brightness controller from keyboard
- Picture show facility (up to 255 image files)
- 3-dimensional projection with two linearity modes and three intensities
- High-pass (three intensities), low-pass and median filtering
- Instantaneous contrast equalisation enhancement and contrast stretching
- Histogram frequency graph, image negation and inversion
- Unattended operation of up to 99 passes or METEOSAT frames
- Unattended operation time plans can be saved and reused, e.g. METEOSAT C02
- Saves pictures in compressed format (average 30% saving)
- Simple menu-driven system - no mouse required
- Monochrome and Colour animation with selectable image zooming and choice of palettes
- Extended memory support for animation (greater than 10 frames/second on a 386sx 16Mhz)
- TH2SAT is a single, self-contained program - all features work with all satellite images
- PCX image translator program included

TH2SAT Demonstration Disc - £3.50 including P&P

A demonstration disc with sample pictures containing the full TH2SAT system (excluding image reception capability) - not just a picture show. When ordering, please state disc size (3½" or 5¼"), disc density and video card (VGA or ½ / 1 Megabyte Super VGA).

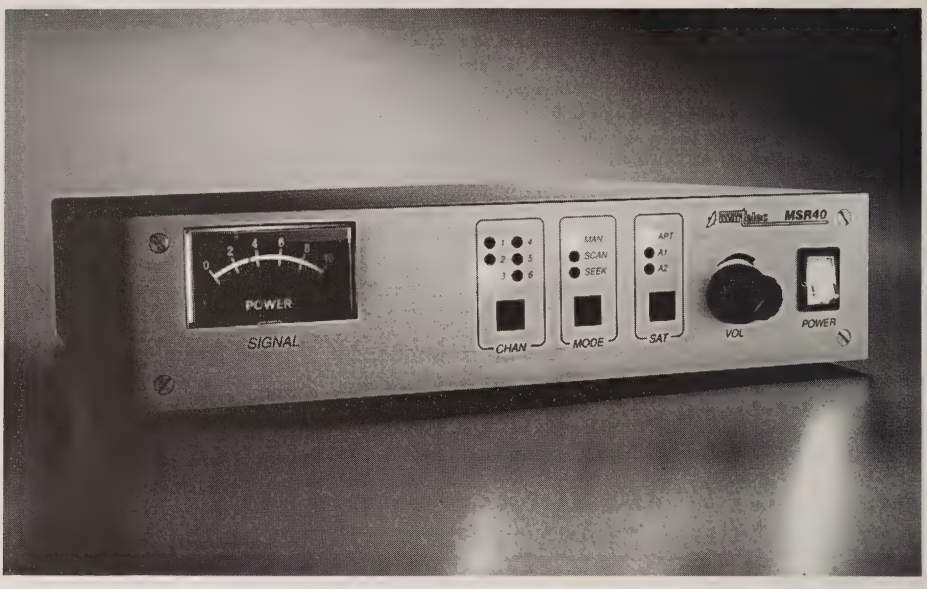
METEOSAT Loop Yagis - from £55 + £6 P&P or £12 Courier Delivery

TH2 Imaging supply 37 element loop Yagis (complete with "N" type connector) for METEOSAT reception. They are provided as an easy-to-assemble kit. Yagis with more than 37 elements are available on request.

TH2 Imaging operates on the basis of the price you see is the price you pay. There are no **hidden extras** or **additional charges**. These prices apply to RIG members only. Postage rates apply to UK.

MSR40 Synthesized Satellite Receiver

.....When quality counts



The result of 12 month's intensive R & D, and rigorous testing, the all new MSR40 is a truly outstanding performer. Designed in accordance with the principles set out in Roger Belcher's authoritative article (RIG27), and fully conforming with his specifications for the highest possible level of interference rejection, this receiver is the measure by which others will be judged.

Housed in a custom-designed aluminium enclosure, the MSR40 is both attractive and rugged. Inside, its rigorously designed and tested circuitry ensures that you have the highest performance currently available. If you would like to know more about the MSR40, please call or write.

Features:

- *Extremely high interference rejection capability (Rejection of > + 13dBm at 200KHz offset)*
- *Fully synthesized*
- *Attractive, compact design*
- *Remote control facility*
- *Mains or DC power*
- *Separate inputs for Meteosat and VHF inputs*
- *Meteosat downconverter power via coax feed*
- *Signal level meter*
- *Intelligent Search and Scan modes*
- *Signal Level Output on rear panel*
- *Constant output level when switching APT/WEFAX*

The MSR40 is sold on a money-back guarantee basis.

Price £295
(excl. VAT & carriage)

martelec *communication systems*

The Acorns, Wyck Lane, East Worldham, Alton, Hampshire, GU34 3AW, U.K. Tel/Fax 0420 82752

AMIGASAT 3.0 Decode Package

A Powerful Weather Satellite Processing Package for the Commodore Amiga Computer Range

Amigasat has long been renowned for its excellent DSP and image processing power. The new version 3.0 builds on that reputation to provide a first class package providing numerous image processing techniques which are both powerful and easy to use.

The Amiga range of computers was originally designed as a video processing platform, and so it is no surprise that it excels in this department. Commodore have launched three advanced new machines (1200, 2400, 4000) having the new AGA graphics chip set, to provide superb high resolution graphics. Because the Amiga is a multitasking machine, Commodore are now releasing them with AREXX, a powerful programming language which enables the new version of Amigasat to be readily configured in every aspect for a particular task - easily!

Most decode packages have some feature or other to separate them from the rest - of the many packages that we have seen, Amigasat stands in a class of its own as the best all round performer.

Check out some of its many features...

- *Automatic image capture using Meteosat or GMS digital headers*
- *Stored resolution to 2048 x 2048 x 256! (e.g. full 17min polar pass)*
- *Extremely powerful, yet simple to use software*
- *Direct input of other IFF or GIF files (such as RIG GIF library) for image processing*
- *Has AREXX, allowing powerful customization of Amigasat application*
- *Most advanced digital signal processing techniques used for outstanding image quality*
- *Animation, with or without hard disc*
- *Runs in Amiga's own multi-tasking environment*
- *Multiple on-screen images*
- *Mathematical mixing of multiple images*
- *Registered users receive free newsletter and low-cost upgrades*

still only £139.95

(excl. VAT & carriage)

If you would like to receive our information pack on the Amigasat, or any of our other products, please call or write to the address below. Demonstration disks are available price £5 inclusive.

martelec *communication systems*

The Acorns, Wyck Lane, East Worldham, Alton, Hants, U.K. GU34 3AW Tel./Fax (44) 0420 82752

Timestep

Meteosat Meteosat is probably the best place to start. It sends images constantly. You could by one of our ready to go systems, or you can buy the parts separately. Remember you do not need a NOAA receiver if you use our Meteosat Receiver. This will free your NOAA system to look for the Soviet polar orbiters, something every satellite enthusiast should be doing !

	Britain	EC Countries	USA	World
* 1.0M pole mount dish and feed	£199.00	£255.00	n/a	n/a
* Meteosat P-HEMT pre-amplifier	£255.00	£265.00	$450.00	£240.00
* 20M cable	£ 20.00	£ 23.00	$ 70.00	£ 22.00
* Meteosat receiver	£255.00	£265.00	$450.00	£240.00
* PROsat II IV/MegaNOAA card	£199.00	£225.00	$349.00	£185.00
* PROSAT connecting cable	£ 15.00	£ 20.00	$ 30.00	£ 18.00
Colour Animate	£199.00	£225.00	call	£185.00
Dish feed (coffee can type)	£ 49.00	£ 59.00	$ 99.00	£ 66.00

* **Complete ready to go Meteosat system (less computer) £940.00 inc This is all you need to start receiving weather images every 4 minutes 24 hours a day !**

NOAA The scanning receiver is immune to interference and covers all known satellites including the complete Soviet series.

* Crossed dipole antenna	£ 59.00	£ 69.00	$ 99.00	n/a
* NOAA pre-amplifier	£ 42.00	£ 52.00	$ 65.00	£ 50.00
* 40M cable	£ 40.00	£ 46.00	$140.00	£ 55.00
* PROscan receiver	£299.00	£325.00	$499.00	£280.00
PROsat II IV/MegaNOAA card	£199.00	£225.00	$349.00	£185.00
* TRACK II Prediction Software	£ 49.00	£ 55.00	$ 99.00	£56.00

* These items are needed to upgrade the Meteosat system above.

Image Processing

Multispectral View II	£199.00	£225.00	$349.00	£185.00
24 bit video card	£ 99.95	n/a	n/a	n/a
Satview CD ROM	£ 39.95	£ 45.00	n/a	£ 35.00

Meteosat PDUS

	UK price (call for export)
1.6M dish (inc. patio mount and dish feed)	£399.00
Dish feed (included with the dish above)	£ 49.00
P-HEMP Preamplifier	£255.00
20M cable	£ 20.00
Extra 20M cable and line amplifier	£ 70.00
2 channel PDUS receiver	£699.00
PDUS PC/AT card and full software	£499.00

NOAA HRPT

90cm dish, dual feed, all metal work and galvanised ground stand	£299.00
90 degree combiner and cables	£125.00
Yaesu R5400 Az-El rotator	£469.00
25M control cables and heavy duty connectors pre-fitted must be ordered at the same time as the Az-El rotator	£125.00
Tracking card and software for automatic operation (needs separate computer) available early 94	£299.00
P-HEMT Preamplifier	£255.00
20M signal cable	£ 20.00
Extra 20M signal cable and line amplifier	£ 70.00
6 channel (5 fitted) HRPT receiver	£699.00
HRPT PC/AT card and full software	£499.00
Dish feed (dual polarity, for your own dish))	£ 59.00

All prices include :- VAT at 17.5% and carriage in Britain VAT and Air carriage to EC countries Duty but not sales tax or carriage in N America (carriage is less than $10.00 and shipped from Boston Mass) Air carriage (but not duty or tax) to other destinations.

Timestep PO Box 2001 Newmarket CB8 8XB
Tel. 0440 820040 Fax. 0440 820281

The Committee: Back row, John Tellick, Henry Neale, Dave Cawley, James Brown.
Front row, Michael Gill, Perter Wakelin, Les Currington, Mark Clarke.

Chris Hornby demonstrates the Spacetech system.